Pulp & Paper

Vol. 16, No. 1 JANUARY 1942

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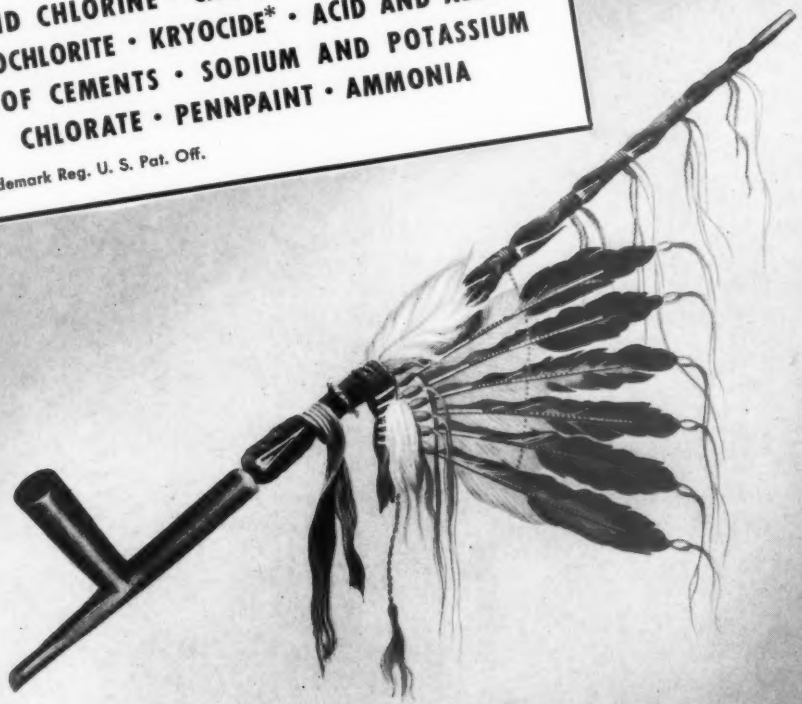

THE PEACE THAT WAS MORE THAN A PIPE-DREAM

After William Penn made his famous treaty under the elm in 1683, he kept such faith with the Indians that his colony prospered from the start. Within three years there were 8,000 colonists living peacefully in Pennsylvania.

Integrity is fruitful in business, too. It is progressiveness in manufacture and persistence in research that gives Penn Salt its reputation for improved chemical products. And it is efficiency that makes its technical service so helpful to customers. The growth of its sales from small beginnings ninety-one years ago to its present nation-wide scope rests chiefly on the record it has earned for keeping faith in every business contact.

CHEMISTRY IS THE KEYSTONE OF INDUSTRY

PENNSYLVANIA SALT MANUFACTURING CO. OF WASHINGTON

Chemicals

TACOMA, WASHINGTON

R V.16, no.1-12 Jan.-Dec.1942

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Here's what Tissue Machine Operators say—

MILL "A" has a Beloit Yankee machine with a 10-foot dryer. "Since the Beloit suction roll was installed the bottom felt life has increased from 6 to 24 days, and the top felt life from 32 to 40 days. Our speed on 10-pound sheet has increased from 600 to 800 feet, and our felt savings come to around $30.00 a day."

MILL "B" installed a Beloit felt driven suction primary press roll on their Yankee machine. "Felt life on the bottom press has increased from 6 to around 13 days, and tonnage from 12 to 13 tons daily to between 17 and 18 tons."

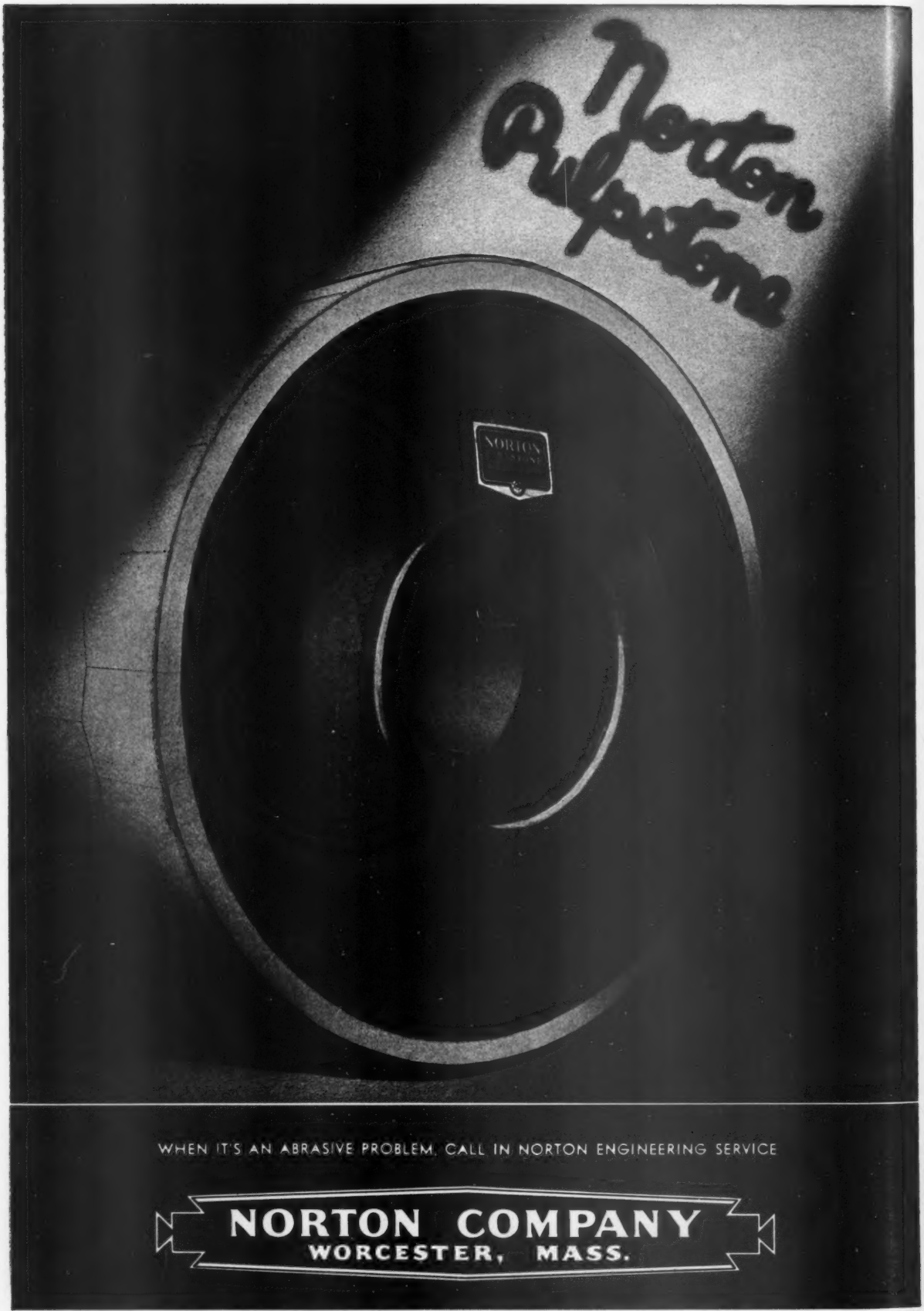
MILL "C" installed a suction press on their Yankee machine recently. "The Beloit suction roll has increased the life of our wet felts from 6 to as high as 28 days, and top felts from 58 (an average of 5 felts) to 145 days. During the period we have had the new roll operating we have made 16 per cent more paper than the corresponding period before we installed the roll."

BELOIT IRON WORKS PAPER MACH'Y BELOIT, WIS. U.S.A.

Engineering MAKES THE MACHINE

BELOIT

TECHNOLOGY
1081243



Pacific Coast Representatives: Pacific Coast Supply Co., Pittock Block, Portland, Ore.; 805 White Bldg., Seattle, Wash.; 343 Sansome St., San Francisco, Calif.

Annual Capacity
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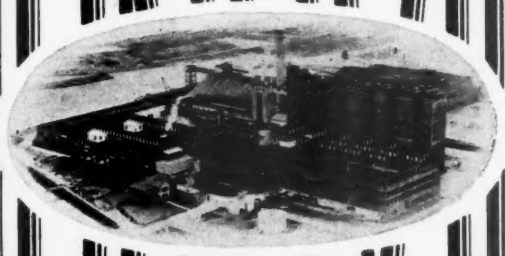
SOUNDVIEW



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Pacific PULP & PAPER Industry

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Will There Be a Paper Shortage?

Surveys of the American Paper & Pulp Association indicate that the over-all total of paper production will probably equal the demand, although shortages are likely to appear from time to time in various types of paper. However, an ample supply is predicated upon sufficient maintenance and raw materials to keep the machines running.

WILL there be a paper shortage? No one can say for certain whether or not there will be ample paper during 1942 for civilian uses. There will be no shortage in paper and paperboard for military purposes. None can be tolerated. In recent months there has been much talk about a four to five million ton over-all shortage in paper and paperboard production in 1942.

The drives to collect waste paper and to economize in the use of paper and paperboard, the occasional shortage of paper bags at the corner grocery, tended to create the general impression that we would be seriously short of paper and board during the present year.

As 1941 neared its close, facts on production and consumption became available and the American Paper & Pulp Association has analyzed them for the benefit of the government, the industry and the general consuming public.

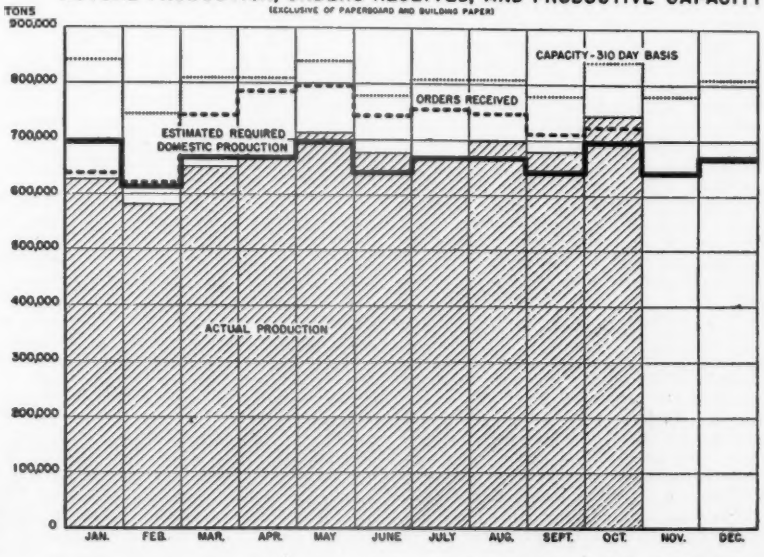
Out of this analysis comes the conclusion that the over-all supply of paper and paperboard will probably be enough to cover military and civilian needs in 1942, although grade shortages will likely occur from time to time. **This conclusion is predicated, however, upon the assumption that raw and maintenance materials will be available to keep the paper and paperboard machines running as fast as orders require.**

In a recent Monthly Summary the American Paper & Pulp Association published the accompanying chart of estimated required domestic production (estimated by the OPM), actual production, orders received and productive capacity. Along with the chart the Association commented as follows:

"Since early in the year there has been a tremendous demand for manufactured goods. This demand has included not only actual requirements, which have been abnormally large due to greatly increased general business activity, but has been augmented by consumer fears of possible shortages in the future as the defense effort requires more and more of our industrial effort. To a large extent it also resulted from efforts to obtain goods before price increases, resulting from increased production costs, became effective. Today it is generally believed that large inventories of such goods exist in the hands of producers, distributors and consumers.

"Due to these developments the paper industry has been faced with an unprecedented demand for its products upon which has been superimposed the direct and indirect demands for paper for defense purposes with the net result that by September the largest file of unfilled orders in the history of the industry had been accumulated. The peak of orders for the paper industry occurred in May with orders for paper (excluding building paper and paperboard) exceeding production by approximately 85,000 tons. Paper production, however, has been expanding progressively since the

REQUIRED DOMESTIC PAPER PRODUCTION (O.P.M.)
ACTUAL PRODUCTION, ORDERS RECEIVED, AND PRODUCTIVE CAPACITY
(EXCLUSIVE OF PAPERBOARD AND BUILDING PAPER)



American Paper & Pulp Association

first of the year until in October it was actually in excess of orders, with order backlogs showing the first decline since January, 1941.

"The tremendous effort of paper manufacturers in meeting the enormous demand is illustrated by October statistics. During this month production of all grades of paper and paperboard reached the staggering total of approximately 1,600,000 tons or an annual rate of 19,000,000 tons. With imports at the current annual rate of 3,000,000 tons it can be seen that during the month of October paper was currently available at an annual rate of 22,000,000 tons, some 4,500,000 tons in excess of the previous record year of 1940. It is believed that this rate of supply will be adequate for both defense and civilian needs in most grades of paper, particularly in view of the direct and hidden inventories which are believed to exist in the hands of converters, consumers, manufacturers and distributors."

In a recent study of the economic relationships of paper demand it was stated that such items as a few extra rolls of wrapping paper on the shelves of retail merchants might not appear at first glance to be important actors in connection with inventories built up in fear of either shortages or rising prices. However, the study pointed out, three rolls of wrapping paper in each retail establishment in the United States, which is not an excessive inventory, means 75,000 tons of this item alone. Consumer and industrial inventories may, in this way, rise to great proportions and equal many months production.

Those who have estimated 1942's combined military and civilian consumption of paper and paperboard at totals far in excess of 1941 production and imports, have usually based their figures upon a coupling of paper demand with the national income. Examination of this supposed relationship has lately been made by competent authorities and it has been found that total paper consumption cannot be forecast upon the basis of national income alone.

The consumption of printing papers does not rise in proportion to accelerated national income but the papers and boards used physically, such as wrapping, bags, cartons, etc., have shown rapid growth along with national income.

The latter group constitutes the major part of our production and consumption. They are also the group which will be curtailed by war time conditions for their consumption by civilians depends upon the purchasing power. A combination of higher taxes, the elimination of consumer products such as automobiles and tires, and the drastic reduction in the number of refrigerators, washing machines, radios, etc., manufactured, will likewise result in a decrease in those grades of paper employed in their production and sale.

Maintenance

● So far the paper and paperboard industry has done very well in obtaining materials for maintenance of equipment in good operating condition, but now that we are at war the problems will become more acute. The repair and maintenance materials available to industry will depend upon the needs of the military forces, the volume produced and the importance of the industry to the entire war effort.

Paper and paperboard will be kept in production, but some mills may suffer and be forced to curtail operations because of the non-essential character of certain products.

Raw Materials

● With stocks of wood pulp at the mills and in consumers' hands still declining the relationship between the supply and demand has gradually become tighter, but it is said that no paper mill has had to shut down as yet for lack of wood pulp.

As the production of consumer goods declines the demand for the packaging papers and boards will follow suit and this will relieve the pressure, principally on the kraft industry. How the increased demand caused by the war program will balance the decrease in consumer demand is something we have not seen predicted as yet.

A new market for bleached sulphite pulp is taking a small volume away from the paper mills. Starting in October the dissolving pulp mills began supplying government munitions plants with 100 tons per day of nitrating bleached sulphite pulp to augment the deficient supply in cotton linters. This new demand was scheduled to rise to around 350 tons per day by July, 1942, but will undoubtedly attain that figure much sooner, now that we are at war.

As rayon has both essential military and civilian uses and plastics fill essential military needs, their manufacture will continue and so this pulp must come from the supply formerly turned into cellophane and from bleached sulphite papers. The mills producing dissolving bleached sulphites have also made paper pulps. Since October they have made more dissolving and nitrating pulps and less paper pulp. Their customers have been supplied on a pro-rata basis by other mills making bleached sulphite paper pulps but not equipped to produce dissolving or nitrating pulps. It is presumed that this rationing system will be expanded as the new munitions plants come into production. The net result will be less bleached sulphite for papermaking.

The official statement on allocation was released January 10th and reads as follows:

Pulp Allocation Order

● "A program to allocate sulphite pulp among approximately 120 regular customers of three producers whose plants are engaged in war work was announced January 10th by Donald Nelson, director of priorities, OPM. During January 4200 tons of pulp will be set aside.

"The three producers—Rayonier Incorporated, Brown Company and Eastern Corporation—together have an annual pulp production capacity of 500,000 tons. Part of their facilities are being used to produce nitration pulp for explosives.

"Rayonier operates plants at Fernandina, Fla., Port Angeles, Hoquiam, and Shelton, Wash. Eastern's plant is at South Brewer, Maine, and Brown's plant at Berlin, N. H.

"The order which is effective January 9th, requires all sulphite pulp producers in the country, some of whom are not immediately able to make nitration pulp of the required quantities, to contribute proportionately part of their production each month to make up the tonnage allocated. Customers of these producers will have supplies cut accordingly.

"Customers of the three war producers manufacture all types of sulphite paper products. It is believed that the allocation program offers the best method of avoiding shutdowns of mills served by the three producers as it was impossible to purchase pulp directly from other suppliers.

"The amount of pulp to be set aside each month can be purchased by the three government producers at prices no higher than those established by OPA and must be turned over to regular domestic customers without profit or mark up."

Bleached sulphite and sulphate pulps may soon become scarce as the latest chlorine order issued on December 20th by Donald Nelson, director of Priorities of the OPM, places all chlorine under direct allocation and assigns a B-5 priority rating on chlorine employed in bleaching pulp for papermaking.

When it goes into effect, February 1st, the new order assigns but a B-2 priority number for chlorine used in high alpha pulps, dissolving pulps, nitrating pulps, pulps used in the manufacture of photographic base papers, and other pulps in which chlorine is a processing rather than a bleaching chemical.

Until the allocation system is working it will not be clear how much more of a reduction in chlorine consumption the order may necessitate. It is entirely possible that war demands may practically eliminate bleached sulphite and bleached sulphate pulps for papermaking. Already the use of these have been eliminated from some grades of paper.

At the end of last September the technical director for a large paper manufacturer expressed his personal opinion that the continued use of chlorine in bleaching papermaking pulps depended entirely upon the speed with which war materials plants employing chlorine could be placed in operation; that it was merely a matter of time until the use of chlorine by the pulp and paper industry would be reduced to the amount required for slime control.

Chlorine production is being greatly expanded but whether this expansion will permit its continued use for civilian purposes on top of military requirements is a question that cannot be answered now.

Most other raw materials are relatively plentiful. More than adequate stocks of sulphur are available due to the foresight of the sulphur producers. Salt cake will continue to be supplied to the kraft mills. Some materials used in smaller volume such as casein are short.

The hemlock log situation on Puget Sound is tight but so far the mills haven't had to curtail for lack of wood and efforts are under way to increase the log supply.

Simplification

● The number of grades of paper and paperboard are being reduced to conserve raw materials. This simplification will be carried on rapidly in the next few months. It will help to offset rising costs. Carton sizes have been reduced in variety to those making the most efficient use of the sheet sizes.

Papers and boards can be made lighter in weight. Some mills have begun to conserve raw materials in this way and many others will follow suit. Great Britain has greatly expanded the use of avail-

able raw materials by making thinner papers and boards. American industry has always made its products rather heavy just to be sure they gave the maximum service. Paper and paperboard has been no exception. We can get along with lighter weight papers and boards to conserve materials and also to save on freight and postage.

Ingenuity, called into play by necessity, will keep the pulp, paper and paperboard mills running, and producing everything required for military operations and most of the material needed for civilian purposes.

C. Z. Departments Move to New Offices

● The purchasing, industrial and public relations offices, and the offices of Albert Bankus, vice-president, his assistants and secretarial staff are now located on the twelfth floor of the Crown Zellerbach Building in San Francisco.

The offices and suites are most handsome and tastefully decorated.

Coleman, Paraffine Superintendent, Dies

● James T. Coleman, general superintendent of The Paraffine Companies, Inc., plant at Emeryville, California, died January 3, 1942, after a short illness.

Mr. Coleman, whose personality and character made for him a wide circle of warm friends, had been with Paraffine for 27 years. He started as a machinist and worked up to head of the large plant at Emeryville, a position he had occupied since 1938.

To succeed Mr. Coleman, R. H. Shainwald, executive vice president of The Paraffine Companies, announced on January 9th the appointment of Ford M. Tussing as general superintendent.

Mr. Tussing has been with the company for 15 years and received his training under the leadership of Mr. Coleman. Succeeding Mr. Tussing as assistant general superintendent will be Irving Hovgaard.

FORD M. TUSSING, General Superintendent, The Paraffine Companies, succeeding the late James T. Coleman.

O. A. Jorgenson Dies In Vancouver

● Oscar A. Jorgenson, director, secretary and assistant manager of British Columbia Pulp & Paper Company and one of the best known figures in the pulp industry in the Pacific Northwest, died at his home in Vancouver, B. C., December 20th after an illness of only two weeks.

Mr. Jorgenson had been with British Columbia Pulp & Paper Company since its inception and was with the old Whalen Pulp & Paper Mills that preceded it.

Born in Dominion City, Manitoba, Mr. Jorgenson went to British Columbia as a youth and spent practically all his business career in the pulp industry. He was a former president of the British Columbia branch of the Canadian Forestry Association and for many years was interested in the affairs of TAPPI.

In his various capacities with British Columbia Pulp & Paper Company he made frequent visits to the Orient, and he was regarded as one of the best informed men on the coast regarding the market in China and Japan for pulp mill products.

Mr. Jorgenson is survived by his wife, one son and two married daughters. His mother and one brother live in Winnipeg.

Production Ratio 97.4% For 1941

● Based upon the American Paper & Pulp Association's preliminary production ratio figures for December, the industry's plants operated at 97.4 per cent of capacity in 1941.

While the first three weeks in December developed ratios of 107, 105.7 and 107 respectively, the last week's Christmas shutdowns dropped to a preliminary figure of 80 per cent, making the month's average 99.9 per cent.

The low point of the year was January with 85.6 per cent of capacity and the high month was November with a ratio of 106.1 per cent. Only two months, January and February, were below 90 per cent of capacity.

At first glance the production to capacity ratios for 1941 are deceptive. Operations in a great many mills were on a 7-day week a large part of the year. As the Association's capacity rating is on a 6-day basis, the 7-day operations ran the percentage figures well over 100 per cent.

The paperboard industry likewise experienced a record year with a production to capacity on an "inch-hours" basis of 88.25 (December average of 95 per cent being preliminary). October was the high month with 99 per cent of capacity, although the first three weeks of December ran 102, 101 and 101 per cent. The month was pulled down by 76 per cent in the final holiday week. As with paper production the paperboard industry's low point of the year was January which had a per cent of operation of 75.

The industry's 1941 operations at 88.25 per cent of capacity were 15.25 per cent higher than the 1940 percentage; 18.25 per cent better than 1939; and 27.25 per cent higher than 1938 production.

Fir-Tex Union Gives $5 To Each Member In Service

● The Fir-Tex Local Union, No. 2752, International Brotherhood of Pulp, Sulphite & Paper Mill Workers, at Fir-Tex Insulating Board Company, St. Helens, Oregon, donated five dollars to each of the fifteen members who have joined the armed forces. Most of these men are in the army, while others have enlisted with the navy and coast guard. When the union voted to present five-dollar bills to its soldier and sailor members, it also authorized the purchase of $2,000 in defense bonds.

Ben Natwick Now On the Coast

● Ben E. Natwick, Pacific Coast representative for the Appleton Wire Works of Appleton, Wisconsin, returned to the Pacific Coast December 24th, spending the holidays with his parents, Mr. and Mrs. A. G. Natwick, at Camas, Washington. Mr. Natwick has been at the company's plant in Appleton for the past several weeks. His headquarters will be in Portland, Oregon.

1941 INDEX NOW AVAILABLE

An index to Volume 15 (1941) of PACIFIC PULP & PAPER INDUSTRY is now available without charge to all subscribers and advertisers who desire copies.

Included in the index are all technical articles, mill descriptions, general interest articles and major news stories appearing during 1941. A separate index lists the articles, statistical tables and graphs in the 1941 Annual Review & Statistical Number published in May, 1941.

TAPPI Discusses Lime at Large Longview Meeting

Panel discussion on "Lime, Its Manufacture, Use and Recovery in Pulp Mills" opens up a subject upon which it was agreed much work remains to be done.

THE Pacific Section of TAPPI held its first meeting of 1942 at the Hotel Monticello in Longview, Washington, on January 6th with 97 men attending.

With the advent of war there had been some discussion as to the advisability of continuing the dinner meetings. The Executive Committee of the Pacific Section checked with the mills in the Pacific Northwest and found sentiment favored their continuance because of the value of the meetings to the industry. Barring unforseen obstacles the three remaining dinner meetings will be held as scheduled: February 3rd at Everett, March 3rd at Portland, and April 7th at Port Angeles.

Unfavorable weather rather than the war kept the attendance at the Longview meeting from being even larger. Chairman of the Pacific Section, Carl E. Braun, vice president and mill manager of the Hawley Pulp & Paper Company, was unable to attend on account of the icy roads around Oregon City.

Vice chairman Edward P. Wood, technical director of the Longview Mill, Pulp Division Weyerhaeuser Timber Company, presided in Mr. Braun's absence, and introduced G. H. Gallaway, assistant technical supervisor, Crown Willamette Paper Co., Division of Crown Zellerbach Corp., Camas, as leader of the panel discussion on "Lime, Its Manufacture, Use and Recovery in Pulp Mills."

The first speaker introduced by Mr. Gallaway was Wolf G. Bauer, ceramic engineer, Washington Brick & Lime Company, Spokane. Mr. Bauer spoke on the manufacture of lime and equipment employed, its chemical and physical characteristics, outlined what is known and not known about its reactions in various chemical processes, and stated briefly the research necessary to provide knowledge for more exact control in both the manufacture and use of lime.

The second speaker, Lloyd Ewing of the technical department of the Longview Fibre Company, outlined the operating problems encountered in recovering lime in the sulphate process, and the third speaker, A. M. Cadigan, technical director of the St. Regis Paper Company, Kraft Pulp Division, Tacoma, spoke on causticizing.

The February TAPPI Dinner

Will be held in Everett, Washington, on Tuesday evening, February 3rd. The place will be announced later. "Logging Waste and Its Potential Value In Pulp Manufacture," will be the subject of a talk by Professor Bror L. Grondal, College of Forestry, University of Washington, Seattle.

The second part of the program will be a round table discussion of "Maintenance." Carl E. Braun, Chairman of the Pacific Section, will lead the discussion of the various systems employed to detect potential material failures and repair them with a minimum of disturbance to operations. Superintendents, plant engineers and technical men will participate in the discussion.

Harold Bialkowsky, Technical Director, Everett Mill, Pulp Division Weyerhaeuser Timber Company, is in charge of arrangements for the Everett Dinner Meeting.

SPEAKERS taking part in the panel discussion of "LIME, Its MANUFACTURE, USE and RECOVERY in PULP MILLS," at the TAPPI Dinner Meeting in Longview, January 6th.

Left to right, WOLF G. BAUER, Ceramic Engineer, Washington Brick & Lime Co., Spokane; WALTER JACOBY, Technical Department, Crown Willamette Paper Co., Division of Crown Zellerbach Corp., Camas; LLOYD EWING, Technical Department, Longview Fibre Co., Langview; G. H. GALLAWAY, Assistant Technical Supervisor, Crown Willamette Paper Co., Division of Crown Zellerbach Corp., Camas, Chairman of the panel discussion.

EDWARD P. WOOD, Vice Chairman of the Pacific Section of TAPPI and Technical Director, Longview Mill, Pulp Division Weyerhaeuser Timber Co., Longview, who presided; A. M. CADIGAN, Technical Director, St. Regis Paper Co., Kraft Pulp Division, Tacoma; and G. F. ALCORN, Plant Engineer, Everett Mill, Pulp Division Weyerhaeuser Timber Co., Everett.

Walter Jacoby of the technical department, Crown Willamette Paper Company, Division of Crown Zellerbach Corporation, Camas, spoke on the use of lime in bleach liquor making.

G. F. Alcorn, plant engineer, Everett Mill, Pulp Division Weyerhaeuser Timber Company, described the pneumatic lime handling system installed last year at Weyerhaeuser's Everett mill which permits the purchasing of lime in bulk. Slides illustrated the system employed at Everett.

The detailed panel discussion appears elsewhere in this issue.

Vice chairman Wood announced that the next dinner meeting would be held on Tuesday evening, February 3rd at Everett, Washington, and that the details of the program would be announced later. He expressed the thanks of TAPPI to Preston Varney, shift superintendent, Longview Mill, Pulp Division Weyerhaeuser Timber Company, for making all arrangements for the Longview dinner meeting.

The following men attended the Longview dinner meeting, January 6, 1942:

• **O. C. Abbott,** Bristol Company Seattle; **J. Allen,** Pulp Division Weyerhaeuser Timber Co., Everett; **Fred Armbruster,** Great Western Division Dow Chemical Company, Seattle; **E. R. Barrett,** A. O. Smith Corp., Seattle; **Wolf G. Bauer,** Washington Brick & Lime Co., Williams, Oregon; **C. T. Beals,** Crown Willamette Paper Co., Division of Crown Zellerbach Corp., Camas; **Geo. H. Beisse,** Pulp Division Weyerhaeuser Timber Co., Longview; **John I. Benedict,** Longview Fibre Co., Longview; **Homer H. Best,** Pulp Divisoin Weyerhaeuser Timber Co., Longview.

Harold W. Bialkowsky, Pulp Division Weyerhaeuser Timber Co., Everett; **Louis H. Blackerby,** Pacific Pulp & Paper Industry, Portland; **Ernie H. Burns,** Longview Fibre Co., Longview; **A. M. Cadigan,** St. Regis Paper Co., Kraft Pulp Division, Tacoma; **J. G. Carson,** Longview Fibre Company, Longview; **Wm. C. Chapman,** Ingersoll-Rand Co., Seattle; **R. E. Chase,** R. E. Chase & Co., Tacoma; **R. E. Chase, Jr.,** R. E. Chase & Co., Portland; **J. W. Clarke,** Longview Fibre Co., Longview; **Wm. W. Clarke,** Longview Fibre Co., Longview.

Henry W. Dauterman, Longview Fibre Co., Longview; **Harold A. Deery,** Pulp Division Weyerhaeuser Timber Co., Longview; **David M. Dibrell,** Longview Fibre Co., Longview; **John Doering,** Research Dept., Weyerhaeuser Timber Co., Longview; **R. E. Drane,** St. Helens Pulp & Paper Co., St. Helens; **Carl J. Dupras,** Longview Fibre Co., Longview; **M. L. Edwards,** Pulp Division Weyerhaeuser Timber Co., Longview; **A. E. Erickson,** Pulp Division Weyerhaeuser Timber Co., Longview; **Ed Escher,** Longview Fibre Co., Longview; **Lloyd Ewing,** Longview Fibre Co., Longview.

Carl Fahlstrom, Longview Fibre Co., Longview; **Donald G. Felthous,** Pulp Division Weyerhaeuser Timber Co., Longview; **Francis W. Flynn,** Crown Willamette Paper Co., Division of Crown Zellerbach Corp., Camas; **Otis W. Fontino,** Longview Fibre Company, Longview; **G. H. Gallaway,** Crown Willamette Paper Co., Division of Crown Zellerbach Corp., Camas; **Wm. R. Gibson,** Northwest Filter Co., Seattle; **James Gould,** Longview Fibre Co., Longview; **Russell Graff,** Longview Fibre Co., Longview; **C. H. Graham,** Bumstead-Woolford, Portland; **R. N. Hammond,** Pulp Division Weyerhaeuser Timber Co., Longview; **Ben Harris,** Pulp Division Weyerhaeuser Timber Co., Longview.

L. G. Harris, Sorg Pulp Company, Port Mellon, B. C.; **John F. Hart,** Longview Fibre Co., Longview; **R. S. Hatch,** Pulp Division Weyerhaeuser Timber Co., Longview; **H. A. Hauff,** Pulp Division Weyerhaeuser Timber Co., Longview; **W. H. Haverman,** Pulp Division Weyerhaeuser Timber Co., Longview; **Wylie Hemphill,** Hemphill Brothers, Seattle; **Kern Hendricks,** Miller & Zehrung Chemical Co., Portland; **E. J. Hinde,** Pulp Division Weyerhaeuser Timber Co., Longview.

H. F. Hoehne, Longview Fibre Co., Longview; **C. F. Holcomb,** Edison Storage Battery Supply Co., Seattle; **W. F. Holzer,** Central Technical Dept. Crown Zellerbach Corp., Camas; **W. C. Jacoby,** Crown Willamette Paper Co., Div. of Crown Zellerbach Corp., Camas; **Lyal Jones,** Pulp Division Weyerhaeuser Timber Co., Longview; **John Klein,** Longview Fibre Co., Longview; **Julium LaPonite,** Longview Fibre Co., Longview; **S. J. Mannus,** Longview Fibre Co., Longview; **Vern L. Mauerman,** Pulp Division Weyerhaeuser Timber Co., Longview; **C. J. McAllister,** Simonds Worden White Co., Portland; **C. R. McCully,** Pulp Division Weyerhaeuser Timber Co., Longview.

C. L. McPhail, Pulp Division Weyerhaeuser Timber Co., Longview; **C. D. Murphy,** Fairman B. Lee, Seattle; **A. G. Natwick,** Crown-Willamette Paper Co., Division of Crown-Zellerbach Corp., Camas; **Ben E. Natwick,** Appleton Wire Works, Portland; **Martin W. Nill, Jr.,** Longview Fibre Co., Longview; **Mr. Emil Nixon,** Longview Fibre Co., Longview; **M. H. Norton,** Longview Fibre Co., Longview; **Max R. Oberdorfer,** St. Helens Pulp & Paper Co., St. Helens, Oregon; **F. A. Olmsted,** Crown Willamette Paper Co. Division of Crown-Zellerbach Corp., Camas; **H. T. Peterson,** Pulp Division Weyerhaeuser Timber Co., Longview.

R. T. Petrie, Black-Clawson Co., Portland; **William Pittam,** Pulp Division Weyerhaeuser Timber Co., Longview; **H. H. Richmond,** Electric Steel Foundry, Portland; **Walter A. Salmonson,** Simonds Worden White Co., Seattle; **John W. Schuh,** Longview Fibre Co., Longview; **Harlan Scott,** Pacific Pulp & Paper Industry, Seattle; **Fred Shaneman,** Pennsylvania Salt Mfg. Co. of Washington, Tacoma; **Robert W. Shearer,** Longview Fibre Co., Longview; **J. M. Shedd,** Everett Pulp & Paper Co., Everett; **W. J. Shelton,** Longview Fibre Co., Longview; **D. L. Shirley,** Link-Belt Co., Portland.

A. P. Siebers, Longview Fibre Co., Longview; **Larry K. Smith,** Pacific Pulp & Paper Industry, Seattle; **Ray Smythe,** Rice Barton Corp., Portland; **Earl G. Thompson,** Great Western Division The Dow Chemical Co., Seattle; **Preston Varney,** Pulp Division Weyerhaeuser Timber Co., Longview; **R. O. Vognild,** Hooker Electrochemical Co., Tacoma; **W. E. Wegner,** Crown-Willamette Paper Co. Division of Crown-Zellerbach Corp., Camas; **W. A. Wengel,** Longview Fibre Co., Longview; **R. S. Wertheimer,** Longview Firbe Co., Longview; **Bob Wilcox,** Longview Fibre Co., Longview; **Jack Wilcox,** Electric Steel Foundry Co., Portland; **John A. Wilcox,** Longview Fibre Co., Longview; **Edward P. Wood,** Pulp Division Weyerhaeuser Timber Co., Longview.

Powell River Making 9-Point Liner

• Powell River Company has added 9-point liner corrugated board to its list of products and has already developed production to the point that last December more than 3000 tons was manufactured. There was a ready sale for it, as wartime industries, especially those engaged in the export trade, have greatly increased their requirements of stock suitable for the making of cartons and packing material.

Powell River Company has been devoting No. 7 paper machine to the manufacture of corrugated board and while this has reduced newsprint production to some extent the change has been warranted by the rush of orders.

In addition to newsprint and liner stock, Powell River Company is manufacturing sulphite pulp and building paper.

F. C. Shaneman Elected Vice-President of Penn Salt

• On January 1st an announcement was received on the Pacific Coast from Mr. Leonard T. Beale of Philadelphia, president of the Pennsylvania Salt Manufacturing Company and its subsidiary, Pennsylvania Salt Manufacturing Company of Washington, that Fred C. Shaneman, manager since 1934 and vice-president of the subsidiary since 1939, had been elected vice-president of the parent company at a meeting of the board of directors held late in December.

Mr. Shaneman joined the company's organization at Tacoma in 1930 shortly after the establishment there of its first plant in the West for the manufacture of chlorine and caustic soda and has been actively associated with the growth of the Pennsylvania Salt Manufacturing Company's operations on the Pacific Coast serving the pulp and paper industry and chemical consuming enterprises.

In addition to the large electro-chemical plant at Tacoma, Washington, the Pennsylvania Salt Manufacturing Company of Washington has recently put into operation a new plant situated on a fifty acre tract on the Willamette River at Portland, Oregon, manufacturing sodium and potassium chlorates which may be used in the manufacture of explosives, flares, matches, herbicides, etc.

The elevation of Mr. Shaneman to an official position with the Pennsylvania Salt Manufacturing Company which has been an important factor in the chemical industry of this country since 1850, reflects the importance of its Pacific Coast investment in chemical manufacturing plants and the likelihood of further expansion in this territory.

Mr. Shaneman is a member of the Technical Association of the Pulp and Paper Industry and is secretary-treasurer of the Pacific Section. He has been active in civic affairs in Tacoma and is a director of the Puget Sound National Bank, Tacoma.

LIME, Its Manufacture, Use And Recovery in Pulp Mills

A panel discussion at the Dinner Meeting held by the Pacific Section of TAPPI at Longview, January 6th, participated in by five speakers under the leadership of G. H. Gallaway, Assistant Technical Supervisor, Crown Willamette Paper Co., Division of Crown Zellerbach Corp., Camas, Washington.

IN opening the discussion G. H. Gallaway made the following statement:

"There is no doubt about the fact that the efficient use of raw materials is essential to the profitable operation of any industry.

"Of all the raw materials used by the pulp and paper industry, lime is considered by many to be the most mis-used. This is probably due to comparatively little research having been done on lime with the result that little detailed information is available concerning it.

"The purpose of this panel discussion is to cover in some detail: (1) the manufacture of lime and its physical and chemical properties, (2) the operation of kraft mill lime kilns and the use of lime in kraft recovery systems, (3) the use of lime in manufacture of calcium hypochlorite bleach liquor, (4) new innovation in the handling of bulk lime; with the hope that the users of lime in the pulp and paper industry will be interested enough in this subject to satisfy themselves that they are buying the proper type of lime and are handling it in the best possible manner.

"It is hoped also that lime manufacturers may find information in the papers to follow which will give them a better insight into the specifications covering the type of lime best suited to each of the pulping operations."

Lime, Its Manufacture, Physico-Chemical Characteristics, Application and Relation to the Pulp and Paper Industry— A Condensation From the Lecture

Wolf G. Bauer[1]

● To admit that, as a whole, the Northwest Pulp & Paper Industry consists in part of lime plant operations, is to realize at once that there exists an extremely colse relationship between the pulp mill and the lime operator who supplies the original raw materials. It has been the wirter's rare opportunity to study and compare the equipment and techniques of the various mills of this coast area from the standpoint of the lime engineer, and he feels that a good deal can be achieved by the mutual exchange of information covering processing and application.

In this area, some of the mills quarry their own rock, others buy rock and crush it themselves to burn in their own shaft kilns, some calcine crushed rock shipped from lime companies in rotary kilns, many reburn their carbonate sludges, and almost all slake or hydrate their lime in various systems under different schedules and varying results. Very few chemical industries could show a closer relationship with their raw material supplier and show reason why their technical staffs should concern themselves with the many problems of mutual interest.

Present manufacturing methods consist essentially of the quarrying or mining of limestone, crushing, sizing and sorting, calcination in shaft or rotary kilns, and processing by further sizing, sorting and hydration.

In reviewing briefly the calcining equipment, we classify modern shaft kilns into direct-fired, mixed feed, or gas-fired kilns. A shaft kiln is essentially a steel cylinder of ten to sixteen-foot diameter, from twenty-five to seventy feet in height, and lined inside with a refractory lining of varying shapes. Limestone varying from 3 to 16 inches in size is charged into the top and drawn periodically or continuously from the cone-shaped cooler at the bottom. It takes usually from one and one-half to five days for the limestone to pass through such kilns. The mixed-feed kilns as extensively employed in Europe and in our beet sugar plants are charged with both rock and coke for fuel, direct combustion taking place within the mass of rock in the kiln. Direct-fired kilns, employing wood, coal, oil, or powdered coal have combustion chambers from which the ignited gases are conducted to the lime rock in the kiln. The gas-fired kiln is probably the most prevalent type in this country, employing both producer gas and natural gas as fuel. This type of firing lends itself to greater capacities and control, outputs ranging from twenty to one hundred tons per day.

They may produce up to three thousand pounds of lime per square-foot of horizontal shaft area in the calcining zone, with thermal efficiencies from forty-five to seventy-five per cent. They are under induced or forced draft air for combustion preheated by being made to pass through the cooling lime, and can be kept under operation for two or more years before repair is necessary. These handle rock down to three-inch diameter size. Below this size, the rotary kiln is employed, firing either oil, gas, or powdered coal. The low efficiencies of former rotaries are now being raised by insulation, and by elaborate heat recuperating devices. The trend is away from long rotary shells toward equipment employing heat-exchange units of greater efficiencies between the cold feed rock and the exhaust gases, and between the cooling lime and the air for combustion. These kilns now tend to approach shaft kiln efficiencies, and are being brought down from a heat consumption of nine and one-half to five and one-half million Btus per ton of lime.

Hydration equipment for the production of dry hydrate consists primarily of steel containers of many shapes, all incorporating lime and water feeders under manual or automatic control, a mixing arrangement in an open or closed chamber where both water and steam hydration take place, provisions for constant or periodic removal of unslaked material, aging bins or chambers, overflow adjustments, and pulverizing and air-separating machinery to process the hydrate for its many applications. Such equipment may be either continuous, batch-type, or a combination of both, often under temperature and pressure control. Most hydrate sold is made to pass a 200-mesh screen.

It seems that a symposium of this kind should also treat the fundamental concepts and theories associated with lime as thoroughly as is possible in the light of present knowledge, in order to bring to realization the facts that confront us in lime technology, and form a common basis from which to reason and to experiment. Time and space do not permit the treatment of this phase in any degree of detail, especially as investigations have been few and theories not at all unified.

Lime is lime only by nature of its chemical analysis, but by the nature of its carbonate source, its calination history, its hydration history, the media of its grinding process, its molecular, cell or crystal size and arrangement, its apparent specific gravity, its age as oxide or hydrate, and its degree of dispersion, coagulation, ionization, and the amount of its colloidal content in the water system, it is as varied, perplexing and often unpredictable as such an otherwise simple substance could be. All these factors make it necessary to handle it with certain understanding, analyze and sample it with definite techniques, and to visualize its make-up in terms of infinitesimal particles.

During calcination, the rhombohedral crystal cell form of calcium carbonate changes to the cubic oxide arrangement, each cell or space-lattice under the atomic influence increasing from two to four molecules in the oxide form. This new oxide arrangement because of its decrease in cell size and escape of CO_2 molecules results in a very porous condition of the lime, acquiring now a specific gravity of about 1.8, and containing over fifty per cent void space. Spacing between CaO crystals or cells is more than ample to allow H_2O and CO_2 molecules to penetrate or escape. However, at

[1]Ceramic Engineer, Washington Brick & Lime Company, Williams, Oregon.

higher temperatures of calcination or due to formation of low eutectic combinations with certain impurities, the CaO cells move closer together, and the spacing may become too close for the gas and water molecules to move within the mass. This extreme condition is designated as an over-burned condition of the lime. In this state, the lime reaches a specific gravity of almost double that which it formerly possessed, and has become more or less inactive to both hydration and chemical utilization. It is characterized by discoloration, weight, shrinkage cracks, fused surface condition and metallic ring. Between this and the first porous state, we find a great multitude of not only intermediate stages, but also a combination of $CaCO_3$, both as original or re-carbonated oxide, free CaO, CaO partially combined with silicates and other impurities, and CaO made unavailable by partial occlusion or plugging of access channels or pores by $CaCO_3$ or $Ca(OH)_2$. The quantitative proportions and arrangements of this complex system has great influence on the characteristics of the lime in subsequent uses, and determines the time, temperatures, and pressure equilibrium of the hydration process.

The CO_2 molecule is driven off somewhere between 1350 deg. F. and 1650 deg. F., depending on the partial pressure of the CO_2 gas on the inside and outside of the piece of lime. This endothermic reaction holds the piece of lime within this temperature range until completed, after which the piece of lime approaches the temperature of the surrounding combustibles, temperatures which may range from 2000 deg. F. to 2600 deg. F. On cooling, there may be partial recarbonation under certain unfavorable conditions.

When we study hydration, we find that the CaO cell is split into four new hydroxide cells, which, although smaller in size, occupy more space, give up heat, and disrupt the original structure. It is the concentration or quick dissemination of this heat which probably more than any other factor, contributes to the ultimate state and properties of the hydroxide system formed. It is now known that this localized heat can approach calcination temperatures, and due to its effect of removing water molecules held to lime particles by adsorption, tends to form a "hemi-hydrate" or compound of gritty, non-plastic nature.

The water-dispersed hydrate system exhibits cataphoresis, and is, therefore, thought to be colloidal in part. Elevated hydration heats probably form irreversible jells or colloids, especially prevalent in the dry hydrates.

It is generally conceded that the higher the temperature of hydration, the coarser will be the formation of hydroxide crystals; the lower the temperature at which hydration proceeds, the smaller will be the resulting particles. It is the writer's opinion that it should always be specified whether a lime is hard or soft burned before the system in which the lime is to slake can be judged correctly or specified. Similar water-lime ratios may have very unlike effects on the hydrates from these two types of limes, but may be adjusted to bring about very similar results.

Using a large excess of water does not necessarily constitute drowning, provided a certain temperature is eventually reached during hydration. A soft-burned lime which is ordinarily considered "hot" lime due to its rapid slaking action, may actually be quite low in internal temperature due to its porous nature which allows excess cooling water to disseminate the heat evolved. A slower slaking hard-burned lime might, on the other hand, develop high localized temperatures despite excess water with attendant coarser crystallization, because the restricted passages do not allow sufficient water for complete hydration, let alone cooling, and cause agglomeration of oxide and hydrate particles without adsorbed water films to disperse them. There may be two conditions that influence the rate of settling, namely, size and shape of crystals and relative agglomeration of many particles. Often the presence of impurities or faster settling agglomerates can help to carry down the finer suspensions. Higher temperatures and steam reaction during dry hydration allows more mobility and unrestricted crystal growth, and the experiment I am conducting here before your eyes will indicate to you some of the possibilities in influencing settling speed. For each type of lime there is a temperature and lime-water concentration curve that will give optimum reactivity, settling speed, plasticity, viscosity, particle size or other property found best for certain processes, and this should be determined to get best results with any particular lime.

The lime industry is just awakening to its task and opportunities, and the next ten years should bring on revolutionary methods and concepts of value to its ever expanding field of the chemical process industries who use this alkali. Information is being collected with new methods and tools of attack such as the x-ray and electron microscope from many new angles, and it is the writer's firm belief that the trend is toward exceedingly close-controlled calcination producing uniformly high available lime content, and that wherever lime is used ultimately as the hydroxide (which includes practically all uses except metallurgy such as carbide and steel) the product supplied by the lime manufacturer will be in the form of a fine pulverized product of uniform particle-size. This precludes radical changes in calcining apparatus, and indicates bulk shipments, bin storage, mechanical handling and feeding methods, and higher specifications.

This symposium was suggested only as a means to achieve a better acquaintance with a material whose nature and properties are as yet little understood and investigated, and it is hoped that the realization of this will bring on a cooperative spirit of mutual assistance in solving problems of common interest in our respective industries.

Lime Recovery

Lloyd Ewing[2]

● This discussion is intended to cover phases of lime reburning in the Kraft Recovery Process.

The function of a lime recovery is to convert the calcium carbonate sludge formed in the causticizing reaction to active calcium oxide as economically as possible from the standpoints of raw material and operating cost.

The process of recovering lime may be very roughly outlined as follows:

The cooking liquor in the kraft process is produced by causticizing green liquor with quicklime. Green liquor is chiefly a solution of sodium carbonate and sulphide produced by the recovery furnace. The resultant product is a solution of principally sodium hydroxide and sodium sulphide with a precipitate of calcium carbonate suspended in it. This causticizing can be carried out either continuously or in batch. The continuous system is regarded superior but entails more expensive equipment. The liquor is separated from the carbonate sludge by settling.

The resultant calcium carbonate sludge is then washed to the desired concentration by decantation or with a filter either in batch or continuously. The residual alkali content of the washed sludge depends generally on the equipment available but frequently it is regulated in view of its influence on kiln operation. After the sludge has been washed it is commonly thickened on a filter and fed to the kiln.

The common type of kiln used in the kraft industry is the rotary. It consists of a tube between six and ten feet in diameter from ninety to one hundred-fifty feet long, lined at least partially with some refractory and inclined at a pitch in the neighborhood of one-half an inch to the foot. The kiln is rotated propelling the lime down its length in the manner of a large screw.

The discharge end is fired by some common fuel such as oil, producer gas, powdered coke or pitch. The hot flue gas flows counter current to the lime and in so doing first dries it, then heats it and finally calcines it. Customary hot end temperatures are between 2000 deg. and 2400 deg. F. This treatment drives off the carbon dioxide, leaving quicklime suitable for causticizing.

The lime is usually slaked in green liquor under closely controlled conditions. The slaker commonly consists of either a small rotary similar in principle to the kiln or a stationary tank equipped with an agitator. The rotary is most widely preferred. The sludge is then passed through some type of classifier designed to remove the core or unburned lime.

The stray sludge produced is then used to causticize more green liquor and the process is repeated.

A lime recovery is a subordinate process which must be run to fill the requirements of another process which in the kraft industry is the furnaces. It must, to function properly, produce enough lime of a uniform quality to causticize the quantity of green liquor produced by the furnaces.

Uniformity is of utmost importance to successful recovery operation. Any change in such a cyclical process bound closely to other cyclical processes will produce a change, not only in the first cycle, but also in succeeding ones, not only in the process in which it originally occurred, but also in the associated processes.

The optimum production of a lime kiln is governed not by its own characteristics, but by furnace production, which in turn is governed by liquor and steam requirements, which in turn are governed by pulp production. Large storage facilities, however, can effectively reduce this limitation.

[2]Technical Department, Longview Fibre Co., Longview, Washington.

If at any time a lime recovery cannot produce lime enough to causticize the amount of green liquor produced, at least two things occur. It will be necessary to add more fresh lime than is customarily lost in one cycle, which in general results in the eventual loss of this additional lime. Secondly, the addition of more fresh lime than is customary in the causticizing process results in non-uniform operation, the effects of which will be felt for several days.

It may be a foregone conclusion that all mills operating a lime kiln either have enough capacity under normal operating conditions, or are taking steps to enlarge their capacity to such a point.

One of the principal problems confronting the lime recovery operation is the formation of "rings" in the kiln. As most of you know, a ring is a doughnut-like formation somewhere near half way down a kiln formed by the adhering of lime to the walls of the kiln at that point. As operation proceeds, the ring either falls out or builds up to such an extent that production is impaired. At this point the kiln must be shut down and the ring removed by one method or another. The ring falling out of its own accord will invariably result in non-uniform operation. The removal by any method I know of results in large production losses as well as non-uniformity.

To my knowledge, all kraft mills with lime recoveries are bothered to some extent by rings. No one whom I have ever spoken to on this subject would make any concrete or definite statements on methods regarding this ring control, and I wouldn't either if I knew any such method.

The literature is practically devoid of material regarding rings other than to say that most kraft mills are bothered with them. This being a preliminary discussion to open up new thought and possibly investigation on lime problems, it seems only natural that some part of the discussion be devoted to rings. In such a preliminary discussion I assume that the speaker does not necessarily have to know what he is talking about.

First, we might look into the mechanics of the formation. The fact that the temperature gradient of a given kiln is rather well fixed and that ring formation always occurs at very nearly the same point in the kiln would tend to indicate that the formation progresses at a given temperature. This temperature is somewhere below red heat. C.P. calcium carbonate, when brought slowly up to common hot end kiln temperatures, will not ball up at any stage of the heating as will a commercial calcium carbonate sludge. This indicates that ringing is not an intrinsic characteristic of lime but rather of the kraft process.

The tendency of a lime particle to adhere to the kiln wall against the force of gravity is the tendency to ring. The tendency of the particle to adhere must be a function of the area of the particle since the adherence can inconceivably be other than a surface phenomenon. Bearing these factors in mind, it follows that the tendency to ring must be a function of the ratio of surface to mass, which ratio is, of course, a function of particle size. In other words, given a definite attractive force between the kiln wall and the lime particles in some convenient units such as dynes per square centimeter; as the size of the lime particle increases so does the surface; hence, attractive force, but the mass increases at a much greater rate until such a point is reached that the force of gravity exceeds the force of attraction and the particle will no longer adhere to the wall.

If this is correct, the conclusion may be reached that the larger the particle size at the point of ringing the less the tendency to ring, all other factors remaining constant.

In actual practice this conclusion holds true. The wet sludge, as it dries out, forms two things—dust and pellets. It is throughout this size range that the above conclusion is drawn. A pellet will not adhere to the walls and dust, if in proper contact with the wall at the proper temperature, invariably will.

By inspecting the kiln at the point of ringing during a shutdown, it can be noted that under periods of slight ringing the proportion of pellets to dust is large and during periods of heavy ringing the proportion is small.

In the kraft process it is inevitable that the sludge fed to a lime kiln must contain a certain amount of alkali. The amount of this alkali may be varied widely merely by varying the degree of washing. Much has been said but very little written as to what the proper concentration is. Mills customarily operate anywhere from 0.5 per cent to 4 per cent on a Na_2O dry basis. This alkali is chemically about the same as white liquor.

In the laboratory a mixture of this alkali and lime in the proper proportions will fuse at a very low temperature (below red heat) and will immediately resolidify. The implication of this reaction is very important as far as ring formation is concerned. In view of this reaction it may be concluded that if a lime particle coated with this alkali were elevated to the fusion temperature of the alkali and was at the same time in contact with some other object also wetted by the fusion, the two bodies would adhere as the fusion solidified. This can, but does not necessarily, explain the phenomenon that occurs within the kiln.

One fact is certain, however; it can be expected that pure lime coated with finely divided particles of alkali will tend to adhere to itself and surroundings at a given temperature somewhere below red heat.

Before drawing any conclusions on the effect of alkali, we should know the form in which it occurs in the lime. As the sludge enters the kiln, the alkali is carried in solution by the liquid contained in the sludge. As the sludge passes down the kiln, the liquid evaporates, leaving the resultant solution more concentrated. As this action proceeds, the solution finally reaches the saturation point and the alkali will crystallize out on the lime. As the crystallization is rapid, the crystal size is small which will make it possible to cover a large surface of lime with a relatively small amount of alkali. We may then visualize the lime as crystals covered with minute crystals of alkali. Under these circumstances it is hard to imagine the lime doing anything other than sticking to itself as soon as it reaches the fusion point of the alkali. The more alkali present, the more should be the tendency to adhere.

It does not necessarily follow that the more alkali, the more rings, without analyzing the other effects of alkali.

One such effect is that wet sludge with alkali present will dry out to a harder mass than will a lime sludge without alkali. The relationship seems to be: the more alkali, the harder the mass. The expected result in the kiln would be forming a larger percentage of pellets at point of drying. In practice this holds true.

Looking at this fact alone, one might conclude the higher the alkali, the less the tendency to ring. This statement, of course, is in complete contradiction with the first noted effect of alkali.

There is much to be said for operating at both a high and low percentage alkali. The two factors mentioned above appear to work against one another both in theory and practice. From observation it can safely be said that operating at a lower percentage of alkali will produce a pronounced tendency toward ringing but the rings formed are soft and very likely to fall out before they become serious. This is presumably due to the fact that there is a high concentration of dust behind the ring which will promote rapid ring formation; at the same time there is a low percentage of alkali in the dust which will tend to produce soft rings quite susceptible to collapse.

When operating with a high percentage of alkali, it may be said that ring formation is, under ordinary circumstances, very slow due, presumably, to small percentage of dust but that the rings formed are hard and will rarely ever fall out of their own accord.

Physical characteristics of the lime undoubtedly play a large part in the tendency to ring. I do not know what part they play or what characteristics they are, but it is logical to assume that physical characteristics are bound to materially influence a purely physical phenomenom such as the sludge forming pellets instead of dust in drying. A fine or poor settling sludge seems to form these pellets better than a coarse or fast settling one. Whether or not this is a function of particle size, I do not know.

Impurities such as iron aluminum and silicon can very easily effect the physical characteristics and surely the chemical. What effect these impurities play would be a very interesting, if not enlightening, piece of information.

Volume of feed to the kiln very definitely affects the tendency to ring. For some obscure reason lime in a kiln operating at a reduced rate will dry out with the formation of a much greater percentage of pellets than will the lime in a kiln at full capacity. On several occasions I have seen a kiln run at a reduced rate (1/3-½ capacity) with practically no dust, no chunks and a pronounced reduction of the ring size. This reduction in size can be explained by the abrasive action of the pellets as they rolled over the ring. They literally wore it out. As soon as full production was resumed, the kiln re-exhibited its slight ringing tendency. No difference could be found between the two limes tested on the following basis: % NaOH, Na_2S, Na_2CO_3, Na_2SO_4, $Na_2S_2O_3$, free oxide, moisture, reduction number, iron aluminum and silicon. The only apparent difference was volume of feed.

Another factor that very definitely affects the tendency to ring is the condition of the kiln. The larger the ring present the greater the tendency to ring. This could possibly be explained by the fact that a kiln with a ring in it behaves in the fashion of a pebble mill. The large quantity of lime held behind the ring

reduces itself to a powder by friction and impact.

Free calcium oxide in the sludge seems to influence the ringing characteristics. In general, it is safe to say that free oxide present in even small amounts will increase the proportion of pellets formed which fact is indicated by a slight reduction in dust carry-over as well as visual observation. It must be remembered, however, that carrying free oxide in the sludge neccessitates additional oil consumption and reduced efficiency.

The percentage of moisture present in the sludge can very possibly be an important variable. In raising the moisture content from 40 to 55 per cent, I could detect no difference other than a reduction in kiln capacity. There is widespread belief, however, that raising the moisture content greatly reduces the formations of rings. There may very possibly be truth in this belief.

Methods of removing rings once found are as obscure and numerous as are the conditions influencing them. The most logical and possibly the most costly is shutting down, allowing the kiln to cool and taking the ring out with bars and sldeges. In view of at least 18 hours shut down for such a procedure, the cost in production loss is tremendous. One method entails the cutting of the feed to about half and running water in with the sludge. This method sometimes works if the ring is not too bad, but generally not. Another method is taking the feed entirely out and applying water in place of sludge. This method results in a certain amount of lost production and at the same time is rather hard on the refractory and possibly dangerous.. It is used with moderate success by several mills, but is not 100 per cent efficient. Another method prescribes shutting down entirely and applying water in place of sludge until the entire rings are soaked up and fall out. This sometimes requires a great deal of water, is very hard on the refractory and generally is quite sloppy. It can be made to be 100 per cent efficient if no regard is held for the refractory. Start-up after such a treatment is unusually hard if water reached the hot end during the process, which it frequently does. This method can be dangerous. Special guns have been employed to shoot them out with varying degrees of success. All these methods are applied with wide variations in technique. There are undoubtedly many other methods employed. None of those listed is completely satisfactory. A good method for removing rings would be a great help to any mill operating a lime kiln.

Another important problem confronting lime kiln operation is carry over. It is important from the standpoint of economic loss as well as a nuisance factor. Many variables influence it including alkali, speed of kiln, condition of kiln, and in general most of the factors that influence rings. Any information concerning the control of dust would be valuable. Several new systems for dust handling and collection have been installed in pulp and paper mills. Any information concerning collection methods would be of great interest.

To summarize, several of the variables that affect ring formation are as follows:

1. Alkali: The effects of alkali can work two ways: one promoting formation and the other inhibiting it. Under these circumstances, there must be one or more optimum alkali concentrations. To my knowledge these are unknown.

2. Alkali Make-up: The chemical composition of this alkali, or more generally, sodium compunds, undoubtedly makes a difference in ringing characteristics.

3. Physical Properties: The physical behavior of the sludge as it dries is bound to affect the ringing. There is a good possibility that simple physical tests on the sludge might indicate the nature of sludge from a ringing standpoint. Any such indicative tests would be of great value for investigation.

4. Free Oxide: Free calcium oxide in the sludge has an effect, the extent of which, to my knowledge, is unknown.

5. Moisture: Moisture may very possibly have a distinct effect, but few have ever agreed on its nature or extent.

6. The Load in the Kiln: The load in the kiln has an effect which, if concrete data were available, would prove very useful in kiln design.

7. Iron Aluminum and Silicon: Iron aluminum and silicon very probably affect ringing, but to my knowledge little has been proved or agreed upon concerning these impurities.

The above are only a few of the many variables that can and possibly do affect ringing in a lime kiln. The fact that a lime kiln can be run at a reduced rate without any evidence of ringing would tend to indicate that the problem has some chance of solution. If any accurate information can be made concerning these, or other variables, it would definitely be a step toward solution.

Lime in the Causticizing Operation

A. M. Cadigan[3]

● The function of the causticizing operation is to convert a definite or predetermined portion of the high sodium carbonate content of the green liquor from the dissolving tanks to sodium hydroxide, thus making the liquor suitable for the cooking of pulp. This conversion is accomplished by adding lime to the green liquor — "causticizing" the liquor with lime—according to the reaction,

$$Na_2CO_3 + Ca(OH)_2 = 2\ NaOH + CaCO_3$$

From the viewpoint of efficient operation, it is essential that the procedure or manipulation of the different stages be such that not only the greatest degree of reactivity between the liquor and the lime is secured, but that the characteristics of the calcium carbonate precipitate formed are such that it will settle rapidly to a compact sludge of minimum bulk, thus yielding the greatest volume of completely clarified white liquor.

Since this paper is concerned primarily with the relation of lime to the causticizing operation, only brief mention will be made of the different stages involved in the process.

The first step in the process is the slaking of the lime. This is done by mixing a portion of the clarified green liquor with the lime although in some mills all the green liquor is mixed with the lime at this stage. The mixing is secured by the rotation of the slaker, or by means of propeller type agitators in vertical tanks. After the slaking the slurry is often diluted with green liquor and the cores and grit removed by means of a mechanical classifier.

The slaked lime, or "slurry" is now transferred to the first of a series of vessels known as causticizers where it is mixed with the balance of the green liquor. In this stage the reaction between the lime and the green liquor is completed with the aid of violent agitation and live steam.

The next step in the operation is to separate the calcium carbonate sludge from the liquor as completely as possible. In some instances this is done by filtration, but the most common method here in the Northwest is to make the separation by settling the sludge in large vertical tanks, many of which are equipped with two or three trays, dividing the tanks into compartments. The mud and liquor are pumped to center of the top of the tank where settling begins immediately, the mud settling in the central portion of the tank, the clear liquor working to the periphery of the tank where it is collected in a launder running around the top of each compartment which delivers it to the pump whence it is transferred to the white liquor storage tanks.

The mud is removed continuously from the bottom of the tank and after being thoroughly mixed with water is allowed to settle in a second clarifier. The wash water so produced is used in the dissolving tanks. The washed mud is pumped from the bottom of the second clarifier to the filters where water is often added in order to remove as much soluble alkali as possible; the mud cake is thickened and conveyed to the kiln for the recovery of the lime. The above treatment is applied in those mills that recover the lime. In mills that do not attempt this recovery, the lime, after thorough washing to recover alkali, is wasted to sewer.

The lime used in the causticizing process is for the most part high-grade quicklime, although some hydrated lime is used. The lime should not be only of a high chemical purity, but should possess rapid settling characteristics. That is, the hydrate and subsequent calcium carbonate formed therefrom should be of the type that agglomerate readily with boiling and agitation into large particles that make for rapid settling and complete clarification of the supernatant liquor.

Limes that meet the following specifications have proved satisfactory in the operation:

Available Lime (CaO)	Minimum	92.5%
Ignition Loss	Maximum	1.0%
Acid Insoluble Matter	Less than	1.0%
	Preferably Less than	0.8%
Iron & Aluminum Oxides	Maximum	0.8%
Magnesium Oxide	Maximum	1.50%

Specification for slaking rate requires that 200 grams of the lime added to 300 ml. of distilled water at 20 deg. C. (contained in an insulated iron cup) shall slake at such a rate that a temperature of 99 deg. C. will be reached in not over 80 seconds.

The settling characteristics are specified as follows: A suspension of milk of lime, or of a carefully slaked sample of the lime at a concentration of 30-32 grams CaO per liter, added to a 250 ml. graduated cylinder at a temperature of 37 deg. C. and thoroughly mixed shall settle to not over 40 per cent of the initial height

[3]Technical Director, St. Regis Paper Company, Kraft Pulp Division, Tacoma, Washington.

of the sludge after one hour of settling time. The final sludge (settling over night) to be not over 20 per cent of the initial height of the sludge.

The above specifications apply to fresh lime. The reburned lime should have much the same characteristics, but the tests should be conducted at much higher temperatures.

The usual procedure in practice is to use as much reburned lime as is available, making up any deficiency with fresh lime. A questionnaire submitted to six mills in the Northwest reported the temperature of the green liquor entering the slaker as ranging from 160 to 200 deg. F. and of the reburned lime entering the slaker as ranging from 650 to 2000 deg. F. (with the exception of one case that reported 130 deg. F.), indicating that in a continuous system the reburned lime is reacting at high temperatures. The reburned lime should be tested regularly for available lime which should run 88 to 92 per cent or better, for ignition loss which should run well under 1.00 per cent, and for acid insoluble matter which should not run over 0.5 per cent.

The importance of control, not only of the quality of the lime but of the conditions obtained in the slaking and causticizing stages was brought rather emphatically to attention in one mill. This mill was mixing all the green liquor with the lime (fresh and reburned) in the slaker and completing the reaction in the causticizers. The recording thermometer on the slaker went out of order, but it was decided to carry on without the instrument until it could be repaired. Trouble was first indicated when lumps or balls of the lime mud from the first clarifier plugged the diaphragm pump, the condition becoming so bad in a short time that the sludge line from the clarifier was plugged.

The "Acid Insoluble Matter" content of the lime mud normally ran 0.25 to 0.55 per cent, based on the weight of dry mud. Analysis of these lumps or balls showed the "Acid Insoluble Matter" content to be 21.5 per cent on weight of dry mud. Analysis of fresh lime being used at the time showed 3.5 per cent acid insoluble matter. Since the lime used just previous to noticing the trouble had not been analyzed, it might have been even higher.

There were indications that the temperature in the slaker had not been maintained at the same high level that was normal and indicated continuously on the chart when the recording thermometer was in use, which undoubtedly made for poor slaking and incomplete reaction in the causticizers. These conditions in combination with the high "Acid Insoluble Matter" content of the lime promoted the formation of the lumps or balls that caused the operating difficulties.

The trouble was eliminated when the temperature in the slaker was maintained at boiling as indicated on the recording thermometer that was installed and the use of lime with an "Acid Insoluble Matter" content of not over 1.00 per cent.

Use of Lime in Bleach Liquor Making

W. C. Jacoby[1]

● Rich, high-calcium limes containing a minimum of the oxides of magnesium, iron, aluminum and silicon are considered most satisfactory for use in the manufacture of bleach liquor. Furthermore, since harder burned limes generally produce a faster settling and more compact bleach liquor sludge, they are generally considered superior to the softer burned product provided suitable slaking equipment is available. When equipment is so limited that the dry hydrate cannot be handled, the use of softer burned limes may prove advisable.

Limes considered best for conversion to hypochlorite in bleach liquor manufacture generally have a chemical composition within the following limits:

Over 95.0% Available Calcium Oxide

Under 1.5% Magnesium Oxide

Under 0.5% Iron and Aluminum Oxides

Under 1.0% Acid Insoluble (SiO_2, etc.)

Under 2.0% Ignition Loss (C, CO_2 and H_2O)

The impurities must be limited, not only because they are valueless in the preparation of active hypochlorite, but also because (1) excessive amounts of magnesium and aluminum retard sludge settling, (2) iron may promote decomposition, (3) carbonates increase the sludge volume and form cloudy liquor, and (4) silica not only contributes appreciably to the volume of sludge, but also causes extreme wear on agitator bearings. The presence of impurities in the limestone may have also altered the physical quality of the lime by actual fusion during the burning operation, particularly in the hard burned limes, resulting in a lime difficult to slake. Since hard burned limes normally produce the best settling bleach liquor, those limes high in impurities should be avoided.

The slaking operation also plays an important part in determining the suitability of a lime for use in bleach liquor-making. While the theoretical water requirement is roughly one-third the weight of the lime, actually about twice this amount is necessary to obtain a completely slaked dry hydrate due to water loss as steam. Slaking of hard burned limes to the dry hydrate is the recommended procedure for obtaining the fastest settling bleach liquor. Use of up to ten times the theoretical water requirement will result in a wet paste. Apparently most mills on the Coast are using from twelve to thirty-five times the theoretical amount of water and obtaining a lime slurry thin enough for pumping. Under such conditions, the lime is actually drowned in water and the possibility of loss by local overheating is eleminated. However, the large surplus of water dissipates the heat of reaction so rapidly that incomplete slaking may result. Where drowning the lime is practiced, therefore, a more porous somewhat softer-burned lime actually may prove advantageous due to the greater case of penetration of water into the lime lumps.

Some experimental data is available indicating that higher initial settling rates in bleach liquor sludge are obtained when lime is slaked to the dry hydrate than when drowned in water. This is undoubtedly due in part to the larger particle size obtained in the dryer hydrates. Drowning of the lime under conditions conducive to a low slaking temperature tends to form smaller particles which naturally settle slower. The advantage of slaking to the dry hydrate applies only where the settling time is limited, since the chlorinated sludge from the drowned lime will evidently compact to the same depth if sufficient time is allowed. Under present and proposed OPM Chlorine Limitations, all mills will evidently have plenty of time available for the settling of their sludges, and the advantage of speed at this time is not as pronounced as it will be under normal production schedules. It should be emphasized that correct equipment and expert control is more essential in slaking to the dry hy-

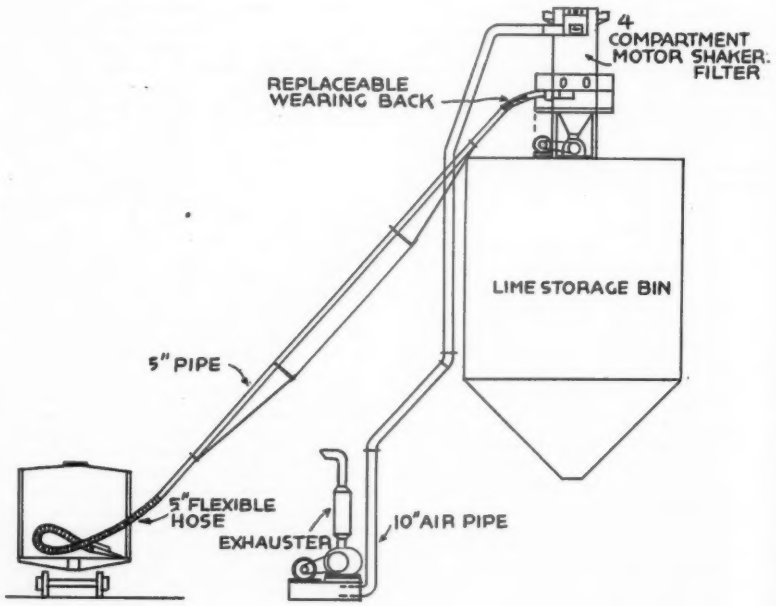


Figure I

[1]Technical Department, Crown Willamette Paper Co., Division of Crown Zellerbach Corp., Camas, Washington.

drate, since there is greater danger of excessive temperatures overburning some of the lime rendering complete slaking impossible.

In some recent experimental work on two medium-hard burned limes, it was discovered that actually faster settling sludge was obtained when the limes were slaked with twelve times the theoretical weight of water than when slaked with only five times the theoretical amount. While this may seem contradictory, the results were consistent and pronounced on both samples and show that the development of lime slaking for use as bleach liquor is not just limited to formation of dryer hydrates. Possibility of improved settling within the range of equipment handling low concentrations of lime slurry is definitely indicated, particularly when somewhat softer limes are used. The investigation was in this case not extended to include slaking to the dry hydrate form. Mr. Bauer's data on slaking conditions leaves little doubt that slaking to the dry hydrate would have excelled over either of the above slaking methods.

This same experimental work was so conducted as to show the effect of unchlorinated lime residues on the initial bleach sludge settling rate. The difference in the settling rate when the unchlorinated lime was varied within the range of 0.5 and 6.0 grams of CaO per liter was found to be great enough to completely mask the effect of slaking. The lower the amount of residual lime present within the limits studied, the faster the sludge settled.

Thus, we see that the settling rates of bleach liquor are not only affetced by the physical and chemical qualities of the quick lime and the methods of slaking, but also by the temperature, the residual unchlorinated lime, and the other impurities, such as carbonates, magnesium, iron, aluminum and silica present in the finished liquor. The system of counter washing to reclaim lime and chlorine from the final sludge tends to magnify the effect of each impurity. To check the relative effect of any change in lime source, burning or slaking upon the settling rate of the bleach liquor sludge, standardization of all these variables is absolutely essential.

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The Handling of Bulk Lime With Pneumatic Equipment

By G. F. Alcorn[5]

● There is in use at the Everett Mill, Pulp Division Weyerhaeuser Timber Company a pneumatic system for unloading bulk pebble lime from box cars directly into a storage tank.

This system is shown diagramatically in Figure I. The operator inserts the end of a flexible metal hose into a pile of lime and keeps it covered. From this point the lime is conveyed to a separator above the storage tank. This separator is shown in Figure II. The lime enters tangentially and drops to the bottom where it is passed through a star valve from a 6-inch vacuum to the storage tank at atmospheric pressure. The air and attendent dust pass to the filter bags shown in Figure II. The bags are provided with shaking devices and on a predetermined cycle a portion of the bags are back-washed with air.

The vacuum pump is a wet type rotary exhauster requiring 30-h.p. and maintaining a vacuum of 6-inch Hg.

This system has been in successful operation for over 6 months and has been almost entirely free of maintenance.

Pebble lime, which will pass a 1-inch mesh, is handled at a rate in excess of 6 tons per hour. There is no objectionable dust involved either in the car or elsewhere.

One man takes care of the entire operation.

[5]Plant Engineer, Everett Mill, Pulp Division, Weyerhaeuser Timber Co., Everett, Washington.

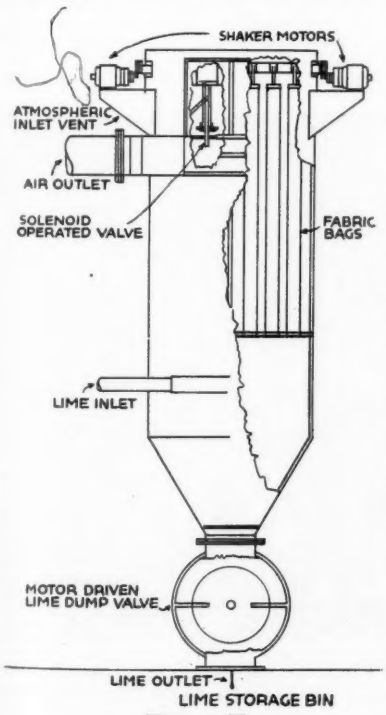


Figure II

Columbia River Changes Furnaces

● The Columbia River Paper Mills, Vancouver, Washington, recently equipped their four 600-H.P. Stirling type boilers with producer gas type furnaces.

The change was made to save fuel and to increase steam generation required by the additional paper machine which went into operation in September, 1941.

Slane Enlists In Naval Reserve

● Collin Slane, treasurer of the Weyerhaeuser Pulp Employees Federal Credit Union Number 1827, and stores clerk of Longview Mill, Pulp Division of Weyerhaeuser Timber Company, Longview, Washington, became a member of the Naval Reserve on January 10th. He joined by enlistment.

Delos Hoeye, of the shipping department, has taken Mr. Slane's position as treasurer of the credit union.

Wilcox Recovering From Broken Arm

● Truman D. Wilcox, machine tender on No. 2 paper machine of the Pioneer Division, The Flintkote Company, Los Angeles, fell and fractured his left arm at the start of the year.

He is expected back on the job February 1st.

Malcolm Pineo Technical Director At Coos Bay

● Malcolm Pineo, technical director of Coos Bay Pulp Corporation, a wholly-owned subsidiary of Scott Paper Company, at Empire, Oregon, came to the Pacific Coast during the latter part of July to take over the technical direction of the plant acquired in June, 1940, by the Scott Paper Company.

Before coming to the coast Pineo was at Chester, Pennsylvania, in the pulp development department of Scott Paper Company, working out new ways of using and blending pulps.

He entered the paper making industry in 1929, when he went to work for Eastern Manufacturing Company at South Brewer, Maine. Here his duties were to dump broke in the beater. In the fall of this year Pineo returned to school. The following summer he went to work for the Scott Paper Company, at Chester. He hired out for summer work and stayed 14 months, as third hand on a paper machine.

Returning to school, he graduated from the University of Maine with a Bachelor of Science degree in 1933, having majored in pulp and paper in the College of Chemical Engineering. In July he again resumed work at the Scott paper mill as third hand on the paper machine, which position he held until January of 1935. He then went into the control laboratory as a control chemist.

Mr. Pineo attended the Institute of Paper Chemistry at Appleton, Wisconsin, for one year as a special student, enrolling in the fall of 1936. He came back to the Scott plant in 1937 as control engineer, where he continued until 1939, when he was promoted to the pulp development department.

MALCOLM PINEO, Technical Director, Coos Bay Pulp Corporation.

Pacific Paperboard Machine In Full Operation

● Number two machine of Pacific Paperboard Company, Longview, Washington, went into production on December 6th. Plain chipboard in sixty and seventy pound weights was being turned out at 15 to 18 tons per day by the first of January.

The chipboard from this machine is cut into two lengths of sheets, at the present time. A winder is being installed early in the year for making rolls. In addition to the lighter weight board already manufactured the company will soon produce 80, 90, and 100-pound chipboard on No. 2 machine.

Prior to starting production, a 150-horsepower fire-tube boiler was installed. It was tied into the steam line the first of December. F. E. Balden and Company, of Portland, made the boiler installation, which increased the steam-plant capacity by 33 1/3 per cent.

Pioneer-Flintkote Girl Bowlers Lead League

● After 15 weeks of bowling, the girls' bowling team of the Pioneer Division, The Flintkote Company, Los Angeles, led the South East Industrial Athletic Association Girls' Bowling League with a total of 43 games won and 17 lost.

Weyerhaeuser Bowlers Show Heels to Puget Sound Teams

● Two bowling teams from the Weyerhaeuser Pulp Mill of Everett showed the teams from the Puget Sound Pulp how to bowl in the second of a home and home series. On December 7th the two mills divided honors, but on December 20th the Everett boys made a clean sweep. Ed Scribner of Bellingham made high games with an above 200 average but an all-time low for Thornton Behme of the same team served to nose out the Puget Pulp boys by only six pins in one game.

Pioneer-Flintkote Blacks Out With Own Paint

● The large roofing and board mill of the Pioneer Division, The Flintkote Company, Los Angeles, was quickly blacked out when war was declared. The company's own specially prepared black-out paint was employed. Many other industrial plants in Southern California used Pioneer-Flintkote's paint to quickly prepare their operations against shut-down during air raids.

This paint, having an asphalt emulsion base, is non-reflective, and when applied to the outside of windows not only prevents all light from escaping, but is also easy to remove with scraper or solvent.

The Pioneer-Flintkote plant is fully organized against air raids. Air raid wardens have been appointed, fire fighting groups and first aid crews organized for each shift, giving the plant protection 24 hours a day.

Camas Down 40 Hours Over Christmas

● A forty-hour shut-down was observed by Crown Willamette Paper Company, Division of Crown Zellerbach Corporation, Camas, Washington, over the Christmas holiday. The plant shut down at 4:00 p. m., December 24th, and resumed operation at 8:00 a. m., December 26th.

Puget Sound Men Complete First Aid Work

● An intensive program of Red Cross first aid instruction was carried on at the Puget Sound Pulp and Timber Company from November 18th until December 19th. A group of thirty-two men received a full course in saving lives and first aid.

In selecting those to take the course the company chose men from every department and several from each shift so that at no time will there be a lack of trained men. With black-outs and the ever present danger of attack, the trainees will fill a very valuable place in the community.

Puget Sound Holds Largest Christmas Party

● Five hundred and fifty members of the Puget Sound Pulp & Timber Company family were entertained by the management at a banquet and dance on the night of December 26th. The huge crowd overflowed the ballroom at the Hotel Leopold, this year's group being the largest party ever held by the Bellingham pulp mill group.

Mr. Lawson Turcotte, treasurer, acted as toastmaster and introduced company and union officials. Those taking a bow were: Walter De Long, operating manager, Erik Ekholm, general superintendent, Ralph Roberg, sales manager, W. C. Keyes, vice president; together with their wives. The retiring president of Local 194, International Brotherhood of Pulp, Sulphite and Paper Mill Workers, Glen McDonald, was presented, and he in turn introduced the incoming Union president, H. P. Rowe.

To vary the diet during the Holidays, a dinner of ham was served, the management knowing that the employees had been well provided with turkeys only two days before. The talks carried the theme of production for defense, with Dr. Keyes urging the buying of Defense Bonds.

Dancing lasted until early morning.

Machine Room Leading Longfibre Bowling League

● The Longfibre Bowling League, now encompassing nine teams of employees of Longview Fibre Company, Longview, Washington, has an active membership of 71 persons. The Machine Room team was leading by mid-December, having won 28 games and lost eight. Second and third positions were held by the Mechanics and Bag Factory teams, respectively.

Earl Bogard, of the Mechanics, has an average of 194 points, the highest of the league. C. Croco, of Box Factory, holds the title for high individual game, with a score of 269. Honors for high individual series goes to Claude Miller, of the Mechanics team. This team is high in the team series with a score of 2958.

Members of the LONGFIBRE BOWLING LEAGUE of the Longview Fibre Company, Longview, Washington. Nine departmental teams make up the league — Machine Room, Mechanics, Bag Factory, Box Factory, Office, Supervisors, Construction, Pulp Mill, and Control.

Port Angeles Men Make Large Contributions to Christmas Fund

● William D. (Billy) Welsh was a happy man when he left Port Angeles, Wash., the day after Christmas to return to his work at Crown Zellerbach Corporation executive offices in San Francisco.

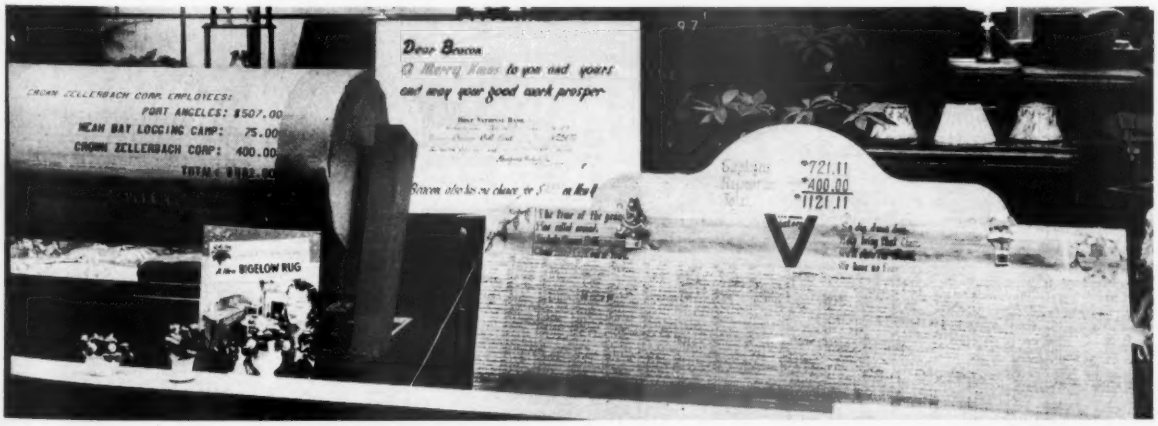
He had just completed his annual "Beacon Bill" community fund campaign at Port Angeles, his former home town, with one of the finest total results in the nearly 20 years of the drive, conducted through columns of the Port Angeles Evening News.

Approximately $5,400 was raised in the campaign this year, along with a great volume of clothing, foodstuffs, toys and other articles. Some of this went into a large number of Christmas baskets sent out to needy people. Most of the cash goes to school hot lunch funds, glasses and dental care for needy children, emergency relief cases throughout the year and other community benefits.

Nearly $2,500 of the cash came from employes and management of the three pulp and paper companies operating at Port Angeles. Rayonier Incorporated sent in $1121.11 along with its traditional big hemlock plank "steak" on which appears the names of the individual scores of contributors. From the Crown Zellerbach newsprint mill came $982, with a simulated large newsprint roll bearing names of donors. Fibreboard Products sent in $251.75 and a huge greeting card to Beacon Bill. Previously, paper mill unions to which most of the individuals contributing belong also gave substantial sums.

The plank "steak," newsprint roll and greeting card all were displayed in a Port Angeles store window, attracting much attention.

WILLIAM D. "BILLY" WELSH, "Beacon Bill" each Christmas, examines some of the donated toys. For nearly 20 years Billy Welsh has conducted this annual campaign for needy children, first as Editor of the Port Angeles Evening News and in recent years on leave of absence from his work with the Crown Zellerbach Corporation in San Francisco.



Port Angeles Pulp and Paper Mills and Employees made large contributions to the annual "Beacon Bill" Christmas Fund most of which goes for hot school lunches, glasses and dental care for needy children.

On the left is the roll of newsprint listing the contributions of the Crown Zellerbach Corporation employees and management; in the center, the Christmas card with check from Fibreboard Products Inc., employees and management; and, on the right the "Hemlock Plank Steak" from the employees and management of Rayonier Incorporated, with each donor's name.

Fernstrom Modernizes Drive On No. 2 Paper Machine

And makes other improvements for more efficient operation.

F. O. FERNSTROM, president of the Fernstrom Paper Mills, Incorporated of Pomona, California, believes in keeping his two-machine tissue mill in condition to produce efficiently. His 1941 modernization program was planned to improve quality and increase production.

The mill was built in an orange grove just outside of Pomona in 1926 by Mr. Fernstrom and his brother Erik Fernstrom, primarily to manufacture tissue for citrus wrapping. Since its establishment as a one-machine paper mill the plant has been steadily improved and expanded to a modern two-machine mill with a 132-inch Yankee machine, trimming 123 inches, and a 134-inch fourdrinier, trimming 126 inches.

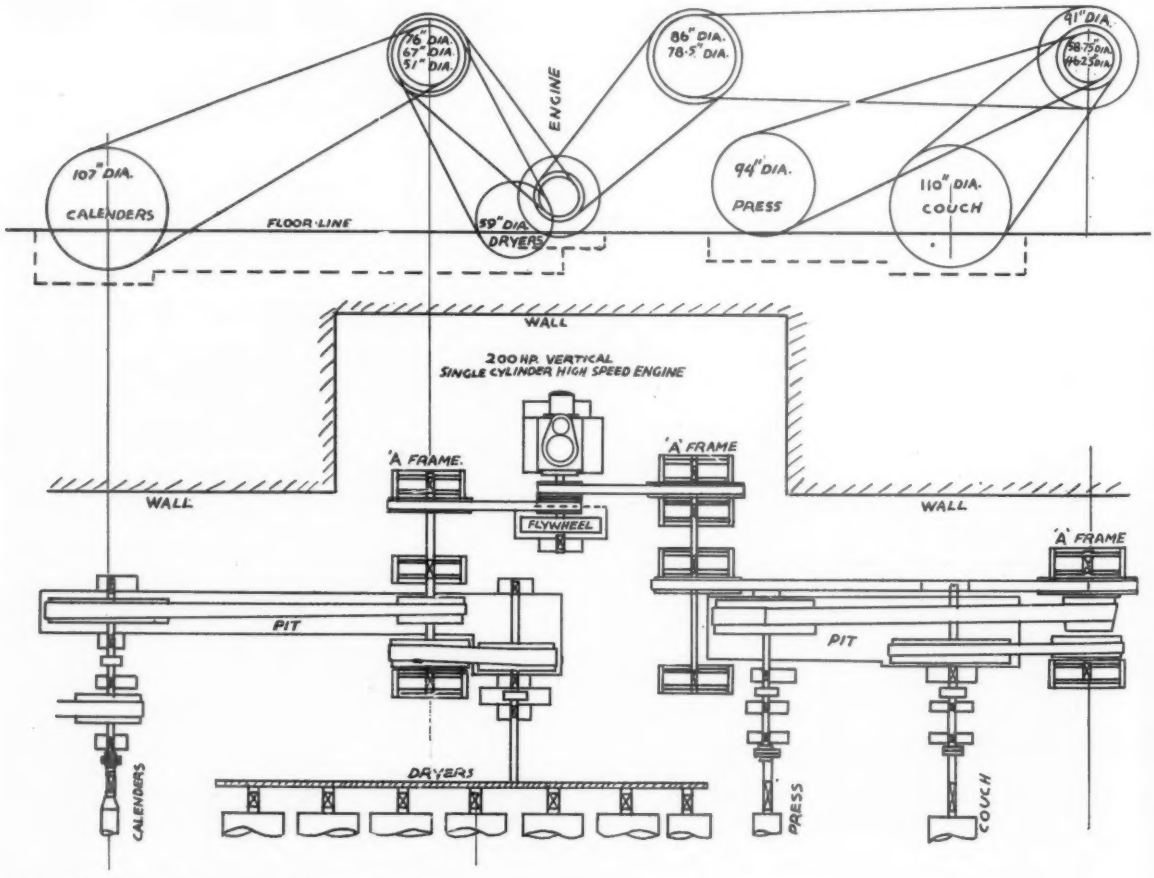
From a single product, citrus wrapping tissue, the Fernstrom list of products has grown until it now includes fruit and vegetable wraps, oiled and unoiled, printed and unprinted, copperized and with a basis weight of 10 pounds and heavier; plain napkins; department store tissue, flat or quirefolded, 10 pounds and heavier; laundry tissue, flat or quirefolded, M.G.; bottle wraps, printed and unprinted, basis weight 10 pounds and heavier; waxing tissues; plant protectors; toilet seat covers; and, other tissue specialties in addition to citrus fruit wraps, treated and untreated, printed and unprinted, one or two colors, basis weight 10 pounds, M.G. and M.F.

At first the market was a local one but now fruit wraps are shipped to most of the districts of the United States producing fruits in commercial quantities, and to Brazil, Cuba, Jamaica, Australia and Hawaii.

Early in 1940 a major step in modernization was completed with the installation of a modern Shartle High Density Pulper and two Morden Stock-Makers together with auxiliary equipment. The next big job was the modernization of the drive on No. 2 paper machine. Along with this work other improvements were made.

Improvements to No. 2 Machine

● The purposes of the improvements to No. 2 paper machine were to increase the speed of production and to improve flexibility in the production of various grades of tissue. The principal types produced on this



The old No. 2 Paper Machine Drive — Speed 690 F. P. M.

machine are treated citrus wrap and wrapping tissues.

The steam engine was replaced with a steam turbine and Black-Clawson angle spiral bevel drives were substituted for the belt driven pulley drives. How the new arrangement simplified the No. 2 machine drive can be quickly seen from a glance at the accompanying sketches and photographs.

Everything was planned for a quick changeover from the old to the new drive with a minimum of lost time. The new turbine, line shaft and drive stands were placed in position before the old drive system was removed. The plan called for the changeover to be accomplished in 6 days.

The work was carried out on schedule. No. 2 machine went down on September 2, 1941 and started up on the 8th, paper being made on the 7th day.

Before the new drive was installed the speed of No. 2 was around 690 feet per minute. After the new drive was in operation experiments were made at speeds up to 850 F.P.M. and the paper was entirely satisfactory. The new drive is designed to handle speeds up to 960 F.P.M.

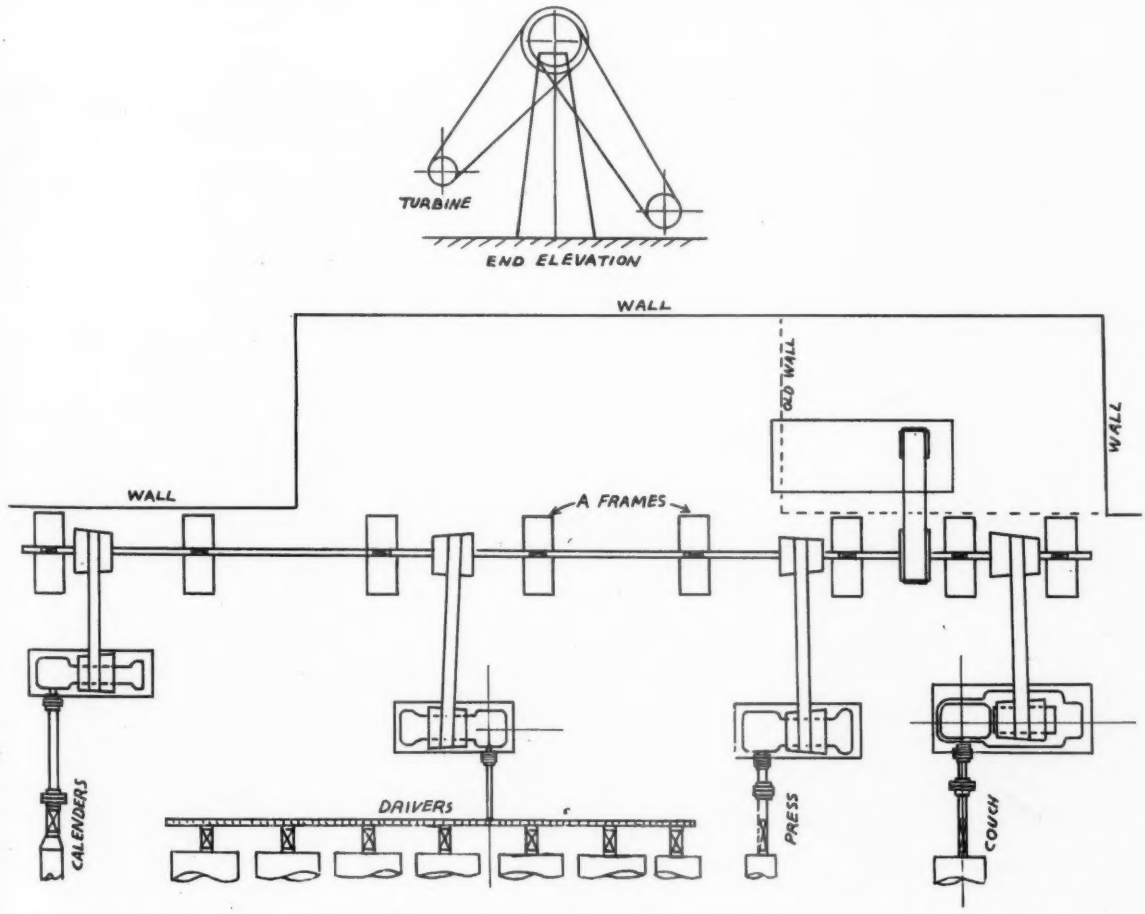
While No. 2 machine was down the old buckets were removed from the dryers and Midwest-Fulton syphons installed to improve the removal of condensate. The condensate system was moved from under the floor plates close to the back of the machine, where it was very hard to get at for adjustments, and moved to an open pit between the line shaft and the dryer drive unit.

All high and low pressure steam piping was changed to fit the new conditions and to effect a complete heat balance of the mill. Combination oil and gas burners were installed in the steam plant. Natural gas is the basic fuel and oil is the auxiliary. A new fuel oil storage tank was installed. A Sheehan rope carrier has since been installed on No. 2 machine to facilitate getting the sheet over.

Turbine Details

● The new Terry steam turbine paper machine drive is designed for a maximum rating of 250 horsepower and to operate on dry-saturated steam at 165-lbs. gauge pressure at the turbine inlet and to exhaust against 10-lbs. to 25-lbs. back pressure. The turbine operates at 4500 R.P.M. which is reduced to 900 R.P.M. at the slow speed gear shaft.

Equipment furnished included: A type G Terry solid wheel turbine complete with an oil relay variable speed fluid type governor with electric remote control and one push button station; four extra hand valves, making a total of six hand valves for flexibility in water rates; flood lubrication to the turbine bearings and a separate emergency trip governor; a type Q Terry double helical herringbone gear with external cooler; high speed Fast's flexible couplings between turbine and gear; low speed Fast's flexible coupling between reduction gear and jack shaft. The jack shaft and pillow blocks are mounted on a con-



The new, simplified No. 2 Paper Machine Drive — Speed 960 F. P. M.

tinuous welded steel base plate together with the Terry turbine and gear.

The Drive Details

Following is the description of the Black-Clawson angle spiral bevel gear drive stands:

Couch—No. S-2 drive stand gear ratio 3-1. Drive stand pulley 33-inch diameter, 40-inch face. Line cone pulley 33.37-inch diameter, 40-inch face. 21-inch multiple disc clutch. No. 4½ Fast's full flexible coupling. Belt shifter.

Press—No. S-0 drive stand gear ratio 3-1. Drive stand pulley 33-inch diameter, 40 inch face. Line cone pulley 29.20-inch diameter, 40-inch face. 18-inch multiple disc clutch. No. 4 Fast's full flexible coupling. Belt shifter.

Dryers — No. S-00 drive stand gear ratio 1½-1. Drive stand pulley 33-inch diameter, 30-inch face. Line cone pulley 34.13-inch diameter, 30-inch face. 18-inch multiple disc clutch. No. 3½ Fast's full flexible coupling. Belt shifter.

Calenders—No. S-0 drive stand gear ratio 3-1. Drive stand pulley 33-inch diameter, 30-inch face. Line cone pulley 33.37-inch diameter, 30-inch face. 18-inch multiple disc clutch. No. 4 Fast's full flexible coupling. Belt shifter.

The drive stands are all of the spiral bevel gear type completely enclosed. All the bearings in the gear case are adjusted at the factory and are sealed inside the casing with no possibility of them being tampered with from outside as was the case with the older types of drive units. A foolproof system of lubrication insures a flow of oil to all working parts at every speed. All pulleys have double arms and flanged edges for additional strength.

These drive stands enable the machine to be operated at speeds up to approximately 1000 F.P.M. Maintenance will be reduced, and there should be fewer breaks in the sheet due to better adjustments of draws between the sections, and the elimination of so many long belts. The new turbine will give better speed control resulting in a more even sheet as to weight, and moisture content.

The old "A" frames used on the counter shafts on the old drive were used to support the new line shaft. The line shaft is supported in SKF bearings on adjustable pillow blocks.

Other Improvements

● Other improvement work carried on by the Fernstrom Paper Mills, Incorporated during 1941 included a conveyor system to facilitate the unloading of pulp from rail cars. The rail siding was extended to accommodate four cars at one time as most of the wood pulp now being received at the mill comes by rail.

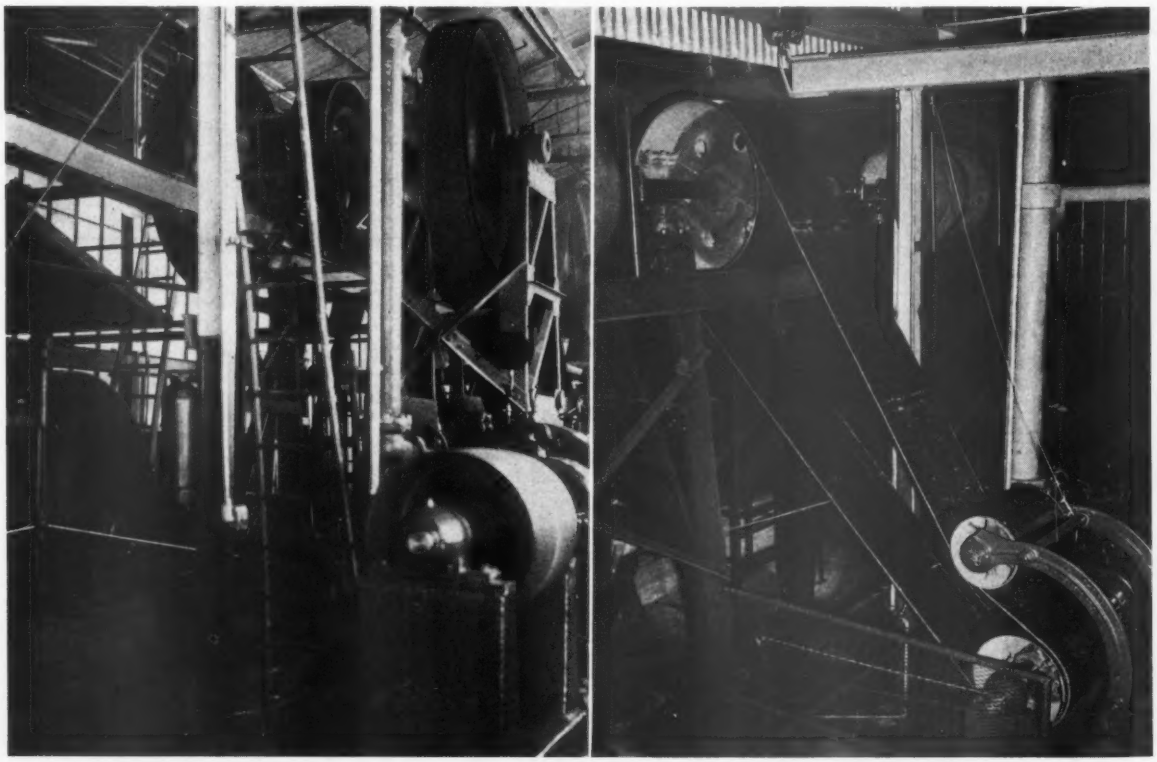
In November at new Protecto toilet seat cover machine was installed to take care of the increased demand for this Fernstrom product.

Many improvements have been made in the laboratory during the year including the installation of a new Valley beater for quality control work.

A Twin-Disc clutch drive was installed on the couch on No. 1 paper machine.

In Charge of the Program

● The Fernstrom improvement program was carried out under the direction of J. W. Genuit, vice president. Herman L. Joachim, consulting engineer of Los Angeles, was in charge of design and installation. Also taking a major part in the program were: Charles G. Frampton,



THE OLD and NEW DRIVES on No. 2 PAPER MACHINE at FERNSTROM PAPER MILLS, Inc., Pomona, California. In the left hand picture the steam turbine is in place but not yet connected. The old steam engine drive is still operating, the large pulleys being driven by belts from the engine which is out of sight behind the turbine.

The right hand picture shows the new line shaft drive installed and connected by belt with the steam turbine in the lower right corner.

superintendent; Jack Jamison, engineer; and R. L. Mitchell, master mechanic.

Paraffine Plants Blackout 8 Hours After Pearl Harbor Attack

● When The Paraffine Companies, Inc., held the first complete industrial blackout of the San Francisco Bay region only 8 hours after the first word of the Japanese bombing of Honolulu had been received, a great many people smiled and said, "Sounds a little hasty."

But this was one case where haste didn't make waste. When R. H. Shainwald, executive vice president of the company, ordered the Sunday night blackout of the huge Pabco plant at Emeryville, California, he had two things in mind: blackouts were bound to come soon—perhaps sooner than anyone imagined and a full supply of blackout materials must be ready for distribution to jobbers and distributors by the next day, Monday. He was right; the next morning brought a flood of orders for blackout paints, papers and fibre boards. An all night Sunday production schedule and subsequent full night runs under blackout conditions of the next three blackout nights enabled Pabco to fill all possible demands for blackout materials.

When subsequent warnings that Japanese planes had flown over the Pacific Coast made blackouts a strict necessity, the Pabco plant was again ahead of time with a well practiced blackout routine that enabled maintenance of a full production schedule without loss of time. While many industrial units were forced to curtail and even stop all night production because of inadequate blackout preparation, the entire Pabco plant hummed on.

The trial blackout on the eventful Sunday of the Honolulu attack was an amazing bit of organization. An hour after reports had come over the radio of the Japanese air raid on Pearl Harbor, R. H. Shainwald was on the phone, talking to acting plant superintendent Ford Tussing asking for a complete plant blackout that night. With only six hours in which to prepare, plans were made, blackout groups were organized and within the first minutes of evening darkness, there was not a spot of light issuing from a single one of the many large Pabco plant units.

To be sure the blackout was a natural for Pabco. All the materials including paints, building blackout papers were on hand ready for use, but most pleasing to the management was the efficient and calm way in which the employees made the difficult preparations and operated the night hours under conditions strange and at times trying to them.

"It was a swift, short notice job and the employees cooperated perfectly," said Shainwald in complimenting the factory management and workers.

"This blackout was just another illustration of the efficiency and ability of American workers in adapting themselves to any situation demanded of them; this war won't harm our productiveness, it will just increase it," added Shainwald.

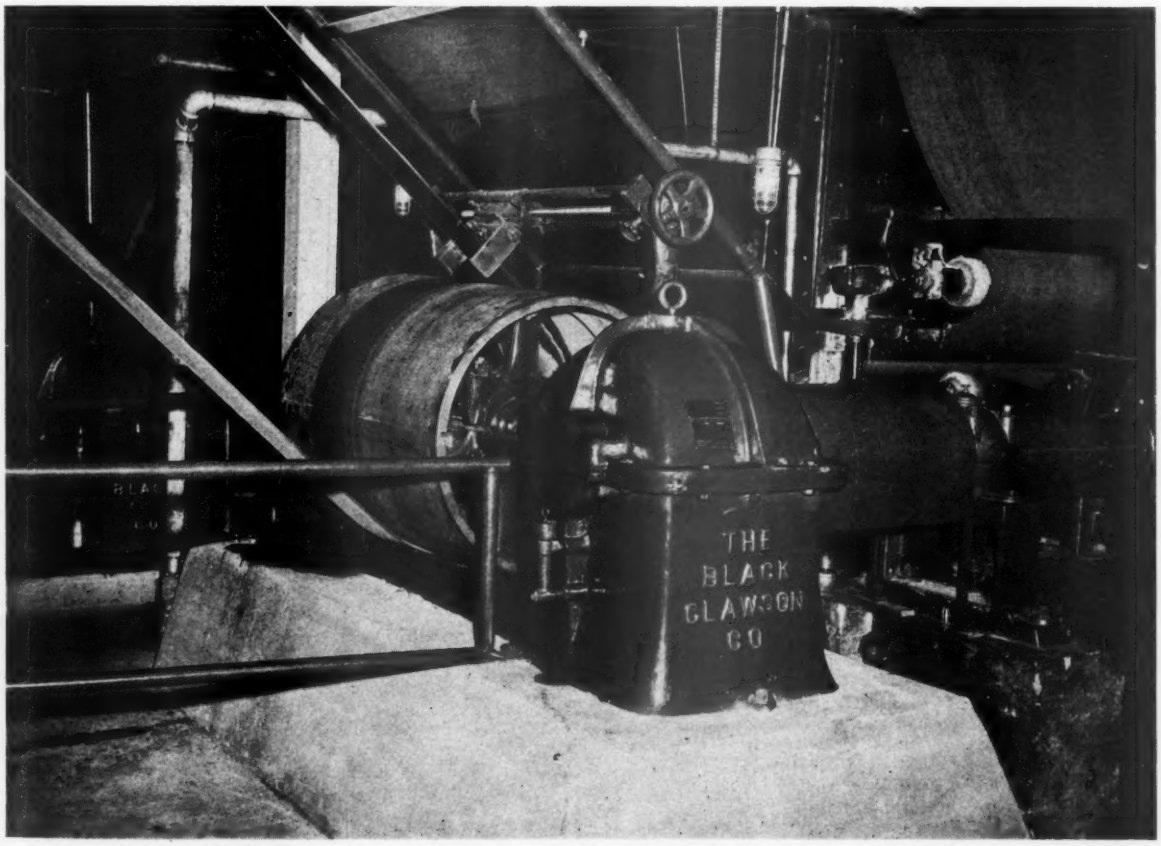
The Paraffine Companies have prepared picture and diagram broadsides of officially approved blackout procedures which are available to other industrial plants upon request.

Thirty-Two Camas Men Join Forces in December

● Thirty-two employees of Crown Willamette Paper Company, Division of Crown Zellerbach Corporation, Camas, Washington, joined with the Nation's armed forces during the month of December. Three persons went into the army air corps, one in naval reserve air corps, three joined the coast guard, seven with the navy, four with naval reserves, nine with the marines and six went with the regular army. All but three of the men joined by enlistment.

To date 49 employees of Crown Willamette Paper Company, Division of Crown Zellerbach Corporation, Camas, Washington, who would have normally been enrolled in the Camas Paper School, have joined with the armed forces. Most of these men had already enrolled for the current year's classes; forty were among the 366 enrollees of the paper school.

These men rank in positions ranging from privates to majors. Eight are commissioned officers, three non-commissioned officers and nine are flying cadets, according to A. G. Natwick, dean of the paper school.



From the new steam turbine driven line shaft power is transmitted by belt to the new BLACK-CLAWSON angle spiral bevel gear drive stands. In the foreground is the press roll drive and in the background the couch drive, both 3-to-1 ratio.

Papermakers and Associates Discuss Stock Preparation

● Opening with a recording of the national anthem played even as Los Angeles was anticipating its second blackout, Papermakers and Associates of Southern California met at Scully's restaurant on December 11th to hear Edward M. Root, sales engineer of Dilts Machine Works, Division of Black-Clawson Co., of Fulton, N. Y., talk on "Modern Methods of Stock Preparation," and Louis B. Spaeth, Franklin Wulff & Company securities expert of Los Angeles, speak on "Fashions in Frauds."

Los Angeles, on the night of December 11th, was very "blackout conscious," since only the previous evening it had undergone its initial darkening with U. S. participation in the war. So it was appropriate that at least one of the visitors, Robert Eminger, secretary-treasurer of the American Pulp & Paper Mill Superintendents Association, should counsel the forty-five men present to remain calm during the anticipated evening blackout. Eminger had just been through three blackouts while making a down-the-coast tour from Seattle to Los Angeles.

Meeting in a thorouhgly "blacked out" dining room, the Papermakers and Associates (PASC) met under the gavel of chairman Herman L. Joachim. First order of business was a door-prize award to Walter Burroughs, holder of the lucky number. Coincidence was that Burroughs was the last man to enter the dining room only a moment or two before the number was announced. Dr. John Stanko made the award, a combination pen-pencil set.

Chairman Joachim reminded the membership present that the papermakers' tools are not guns, rather confidence and paper production, and that their use of these "implements" can do much toward a successful pursuit in the war effort. He

In the top photograph ' ' ' Left to right, RICHARD BUCKLEY, Chairman of the December 11th meeting of PASC; ROBERT L. EMINGER, Secretary-Treasurer, American Pulp & Paper Mill Superintendents Assn., Miamisburg, Ohio; U. GRANT FARMER, Vice Chairman of PASC; JOHN VAN OUNSEM, Secretary, PASC.

The second picture, left to right, W. T. "HAP" TILLOTSON, Treasurer of PASC; LOUIS B. SPAETH, who spoke on "Fashions in Frauds"; E. M. "NED" ROOT, Dilts Division, The Black-Clawson Co., Fulton, N. Y., who presented an illustrated paper on "Modern Methods of Stock Preparation"; HERMAN L. JOACHIM, Chairman of PASC; and Program Chairman Dick Buckley.

The two lower photographs show a number of men attending the December 11th meeting of Papermakers and Associates of Southern California.

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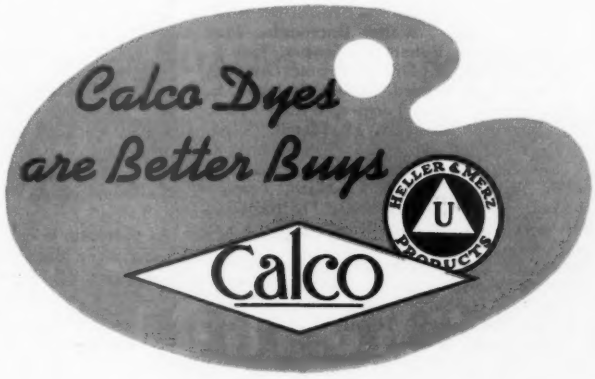

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also stated that current estimates called for 18 million tons of paper for the nation's 1941 production, and 24 million tons for 1942.

"Thus," he said, "our main task is to devote our immediate work toward such production. We are not remote to this war, and we cannot fail in our obligation to see it through to final victory."

Chairman Joachim then introduced six guests, Jack Johns, Owens-Illinois Co.; Ernest Dutcher, Pioneer-Flintkote Co.; Ralph Waldo, National Aniline Division, Allied Chemical & Dye Corp., Robert Petrie, Black-Clawson Co.; A. Eilersgaard, Pioneer-Flintkote; and J. S. Milch, the latter only recently returned from the post of general manager of the China Fibre Container Co., Shanghai.

Mr. Milch gave a short, extemporaneous talk, pointing out that he had seen the war coming some four years ago, and left China in the Spring of 1941 for America. He briefly covered the fundamental steps in board manufacture in China, where primitive methods still prevail generally.

Richard Buckley, program chairman of the evening, introduced the two featured speakers, Spaeth and Root, in that order.

Mr. Spaeth, on "Fashions in Fraud," recounted some amusing and some tragic examples of the work of fraud artists and confidence men, warning his listeners to beware of "something for nothing."

Mr. Root presented an illustrated (with slides) talk on the hydrapulper and allied auxiliary papermaking equipment which, with his descriptive material, covered the subject of "Modern Methods of Stock Preparation" and revealed the progress achieved in recent years in this direction.

The following men attended the December 11th meeting of Papermakers & Associates of Southern California:

Floyd W. Adams, Willard G. Axtell, Robert A. Baum, William Belleman, Bruce Brown, Sr., Bruce Brown, Jr., Richard S. Buckley, Walter Burroughs, Max E. Campbell, Robert E. Cooper, Roy L. Culp, Frank E. Dilley, Ernest Dutcher, George E. Eberhard, Robert Eminger, E. Eilersgaard, Grant Farmer, Wilbur Foote, J. Walter Genuit, A. H. Hatch, J. M. Henshaw.

Herman L. Joachim, Jack Johns, M. W. MacAfee, Parke F. Math, Francis Mark, J. L. Milch, Richard D. Pomeroy, Robert Petrie, Tom Rhodes, Ed Root, Foster Rucker, Otto Sass, Archie Schwartz, John Stanko, Louis Spaeth, W. T. Tillotson, Elmer Toliver, John Van Ounsem, Herbert Vernet, Bruce Wallace, Frank Wheelock, Homer White, and George Zenick.

Rayon Industry Now 30 Years Old

● The American Viscose Corporation, which established the rayon industry in the United States, calls attention to rayon's 30th anniversary.

Production of rayon yarn in 1911, the year in which rayon manufacture began in this country, amounted to 362,544 pounds, and was produced entirely at the Viscose Company's plant at Marcus Hook, Pennsylvania, the only American rayon plant at that time. Today the company's seven plants turn out this amount in less than a day and a half.

In the 30-year period since the beginning of rayon manufacture in the United States, the annual domestic output of rayon yarn and rayon staple fiber has increased more than a thousand-fold to an annual total of around 550,000,000 pounds. Production of the American Viscose Corporation, the largest manufacturer, amounted to 147,000,000 pounds of rayon yarn and rayon staple fiber in 1940, and accounted for 31 per cent of the total domestic ouput of 471,071,000 pounds. Production this year will be slightly larger, as the company is operating at maximum capacity to supply rayon for the hosiery industry and for defense materials in addition to providing for its regular customers in the weaving, knitting and other industries.

Basketball Schedule Resumed This Month

● The South East Industrial Athletic Association of Los Angeles basketball league resumed playing January 6th. The Pioneer Division, The Flintkote Company, is represented in the basketball league.

Some of the teams are being reorganized due to members leaving for military service. All companies are endeavoring to carry out their athletic programs by getting the older men, who are not eligible for military service as yet, interested in taking part.

Petrie to Visit Eastern Mills

● Robert T. Petrie of Portland, Pacific Coast representative of The Black-Clawson Company and its divisions, Shartle Brothers Machine Company and Dilts Machine Works, will leave on an extensive eastern trip the latter part of January.

Mr. Petrie will visit the company's three plants at Hamilton and Middletown, Ohio, and at Fulton, N. Y., as well as a large number of paper and board mills in the Middle West and East where Black-Clawson, Shartle and Dilts equipment has been installed in recent months.

While away he expects to attend the annual meeting of TAPPI in New York, February 16th to 19th, before returning to the Pacific Coast at the end of the month or early in March.

St. Helens Shipping Pulp to Australia

● St. Helens Pulp and Paper Company, St. Helens, Oregon, started shipping baled, unbleached sulphate pulp to Australia the first of the year, according to Max Oberdorfer, president and general manager of the company. He says this pulp is used for the manufacture of paper in Australian paper mills, which formerly obtained their pulp supply from the Scandinavian countries.

These pulp shipments are made under the Lease-Lend Act.

Camas Employees To Carry Identification

● A program was inaugurated December 31st to photograph all employees of the Crown Willamette Paper Company, Division of Crown Zellerbach Corporation, Camas, Washington. Each will be provided with a badge on which the photograph will be mounted. These can be used as identification of the employees in the plant and while travelling to and from work during black-outs, according to J. E. Hanny, resident manager.

The badges will also carry the social security number of the owner.

On patriotic occasions this large American flag and the Pledge of Allegiance are hung over the street in front of the office of the Crown Willamette Paper Company, Division of Crown Zellerbach Corporation at Camas, Washington. Both signs read: "I pledge allegiance to the flag of the United States of America and the republic for which it stands: One nation indivisible, with liberty and justice for all."

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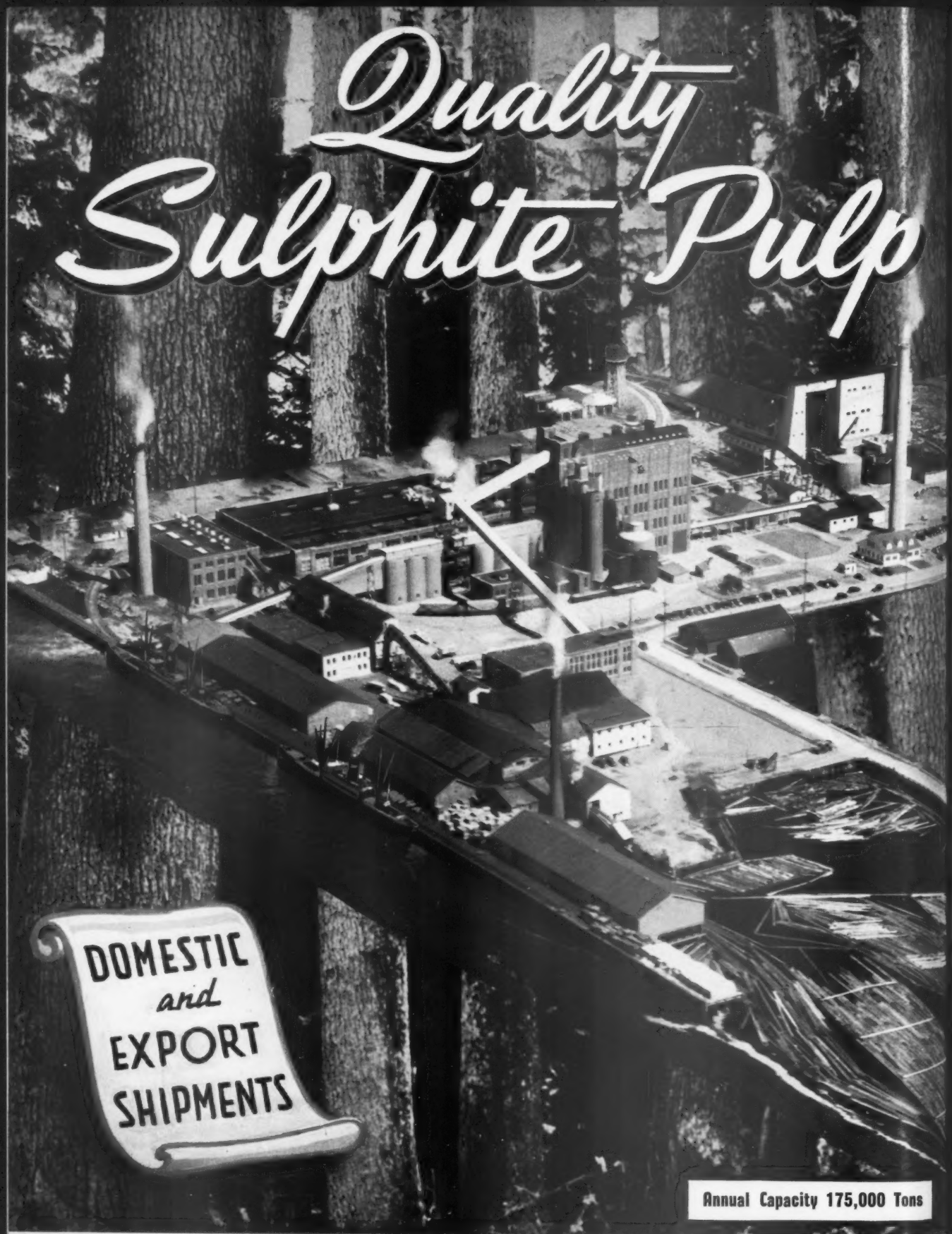

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SULPHUR—No Priorities Needed

A Review of One of the Important Raw Materials for the Pulp and Paper Industry of the United States and Canada.

IN the transformation of forests into paper, the pulp and paper industry leans heavily on a versatile yellow raw material called sulphur. The industry is consuming more than a half million tons a year of this material, or nearly one-fifth of total United States crude sulphur production. It uses more than 270 pounds of sulphur in making one ton of sulphite pulp.

At a time when many products are being allocated by government boards and restricted to defense uses, sulphur stands out as one of the materials in which there is no shortage. It is not on the priority list. Its mine price has not risen.

The story of sulphur progress since its days of scarcity during the first World War and of its position in the present emergency is an interesting and noteworthy chapter in the history of America's industrial growth. The element sulphur, one of the 92 known chemical elements, has been used, of course, for many centuries. Ancient writings disclose that it was employed 4,000 years ago as a bleaching agent for linen and cotton. Egyptian paintings of 1,600 B. C. contain colors that require sulphur compounds. But only in our modern era has sulphur come into its own as an indispensable tool of civilization.

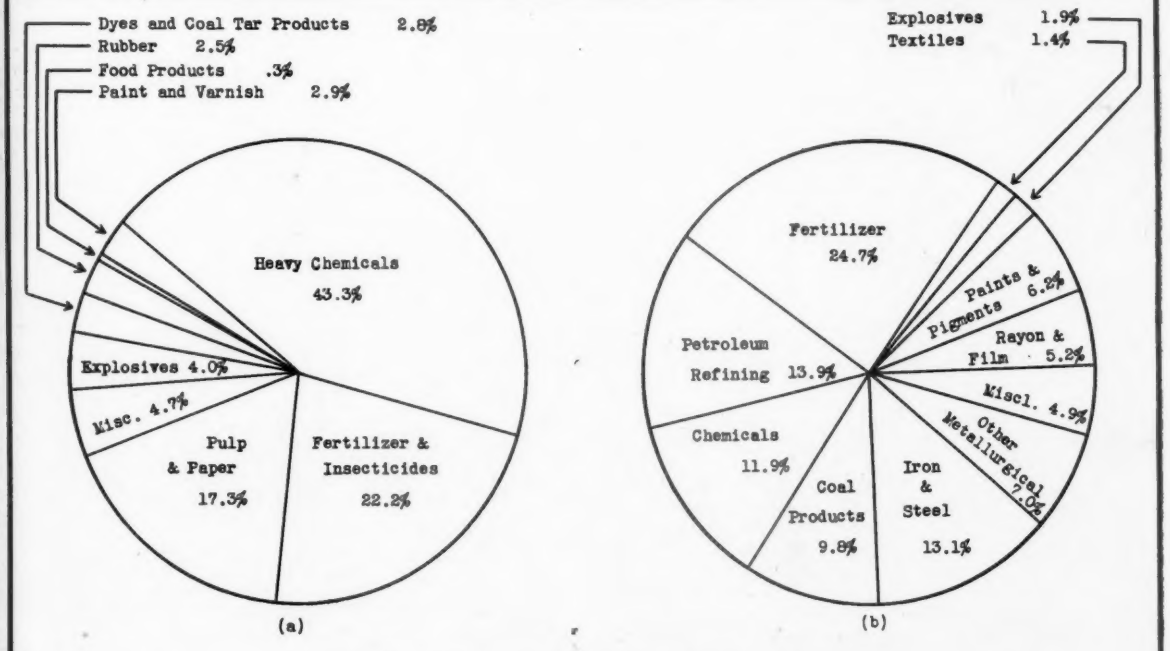
Besides its use by the pulp and paper industry, sulphur today fills necessary roles in the production of such essentials as fertilizer, chemicals, gasoline, iron and steel, insecticides, dyes and coal tar products, vulcanized rubber, paint and varnish, textiles, and rayon and film. For the majority of these uses, it is converted first into sulphuric acid, but it may be used also in the form of ground and refined sulphur, sulphur dioxide, carbon bisulphide and others. To supply these needs, there are several sources of sulphur, the most important of which are pyrites, crude sulphur or brimstone, and by-product gases.

Mining Method Developed

● Practically all the sulphur consumed by the pulp and paper industry is crude sulphur, mined from porous rock formations beneath the Gulf Coast of the United States. The mining process that made possible the development of these Gulf Coast deposits was invented only at the end of the last century. After numerous attempts to mine the deposits by ordinary methods had failed, a petroleum scientist named Herman Frasch conceived the idea of melting the sulphur underground and extracting it in liquid form through pipes.

To accomplish this, Dr. Frasch proposed to pump immense quantities of superheated water into the sulphur formations, which are encased between layers of hard rock on the top of salt domes. The molten sulphur would be lifted to the surface of the ground by the pressure of compressed air. It would then be piped to storage vats to cool and solidify.

Despite almost-universal skepticism and heart-breaking disappointments, Dr. Frasch persisted with his idea. By 1903, some twelve years after the first work, his process had become recognized as a commercial success. This historic invention



DISTRIBUTION BY INDUSTRIES OF (a) SULPHUR AND (b) SULPHURIC ACID USED IN THE UNITED STATES IN 1940

From figures assembled by Chemical and Metallurgical Engineering.

paved the way for eventual independence of America for sulphur supplies, but decades were to pass before the potential mines of the Gulf Coast could be developed to the point where the United States and Canada were completely independent of sulphur sources abroad.

When World War I broke out in 1914, America still relied on imports of pyrites and sulphur for a dangerously-large share of her requirements. As late as 1916, more than one-third of total U. S. sulphur consumption was supplied from abroad. The nation that year consumed from all sources the equivalent of 1,638,000 long tons of sulphur, derived as shown in the table.

With the entry of the United States into the conflict, shipments of foreign pyrites and sulphur to our ports became a weak spot in the war drive. The imports were disrupted by submarine attack and by scarcity of ships. Upon domestic sulphur sources fell the staggering burden not only of replacing these imports but also of meeting the additional requirements resulting from expanded wartime production. Prodigious efforts were made to swell domestic output. The price rose to $35 a ton, while the government fixed a ceiling of $22 a ton for government requirements, direct or indirect. The War Industries Board, through its sulphur and pyrites section in cooperation with a committee of the Chemicals Alliance, assumed complete control of the product of the mines and expedited shipments by sea and land.

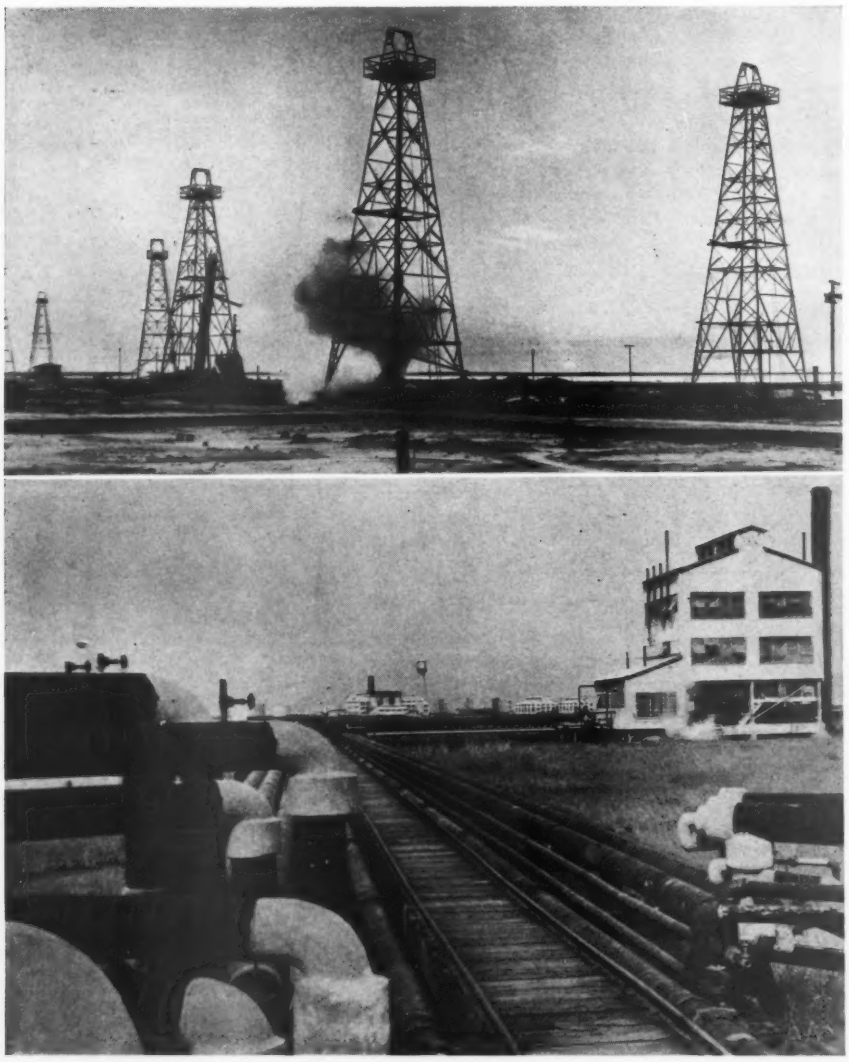
Source	Tonnage	Percentage
Domestic:		
Crude sulphur	638,000	39%
Pyrites	176,000	10%
By-product acid—smelter gas	242,000	15%
	1,056,000	64%
Imported:		
Crude sulphur	22,000	1%
Pyrites	560,000	34%
	582,000	35%

Domestic production in the spring of 1918, nevertheless, was at a rate more than a quarter million tons short of requirements, Grosvenor B. Clarkson, then director of the U. S. Council of National Defense, has stated.

Consumption Expanded

● Since those difficult days, the consumption and uses of sulphur have expanded greatly. The United States last year consumed three times as much crude sulphur as it did in 1916. New industries, such as rayon, have come into existence to absorb large quantities of the output. Older industries, such as steel and petroleum refining, have increased their sulphur requirements. The pulp and paper industry takes much more sulphur than it did a quarter of a century ago and considerably more even than in the boom years of 1928 and 1929. Add these increases to the additional increases brought by the defense program, and the result is a tremendous jump above the peak sulphur requirements of 1917 and 1918.

In the face of this, it is fortunate for America that the U. S. sulphur industry has not stood still. If it had, scores of plants now busy with civilian and defense production would be shut down. The output of dozens of essential products would be restricted to the limited supplies of sulphur that were available.



The upper photograph shows how a sulphur mine looks on the surface. The sulphur is extracted through wells which have derricks resembling those of an oil field.

Miles of insulated pipe appearing in the lower picture are required at every sulphur mine to carry the superheated water and molten sulphur. The swing joints at the left absorb expansion and contraction.

Stocks Five Times Greater

● Since World War I, however, important new sulphur reserves have been discovered, new mines developed, new plants built capable of producing more sulphur than any plant previously. The two Gulf Coast mines of 1916 have been increased to five. Above-ground stocks of crude sulphur are five times as great. As a result of this expansion, the domestic industry has been able to meet in full the rapidly-mounting demands of the current emergency.

In 1939, the year World War II began, the United States consumed 1,600,000 tons of crude sulphur alone. In 1941 this consumption increased to a rate of about 2,300,000 tons. Output of Gulf Coast mines was successfully stepped up to fill not only this total but, at the same time, an additional 700,000 tons for the British Empire. Despite this unprecedented requirement of 3,000,000 tons, the industry was able to keep almost unchanged the immense total of above-ground stocks. These now amount to approximately 4,000,000 tons.

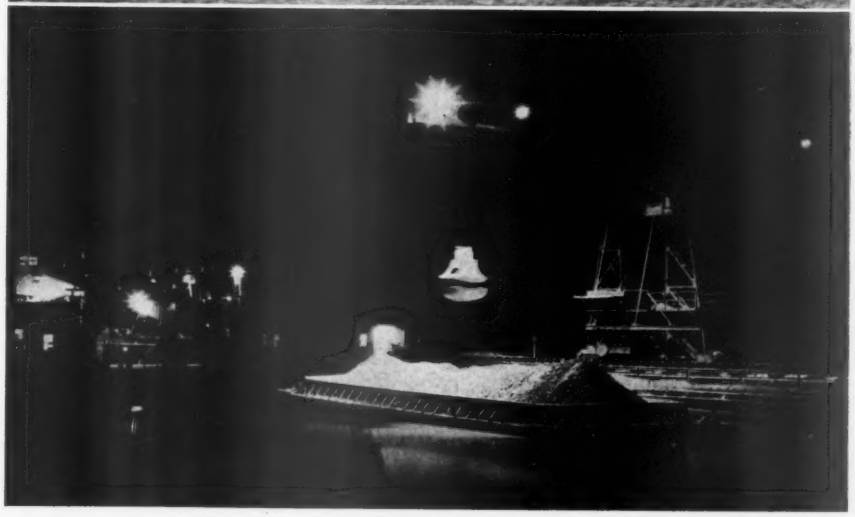
In commenting on America's present strong sulphur position, Langbourne M. Williams, Jr., president of the Freeport Sulphur Company, has called attention to three basic policies of the sulphur industry which contributed to this position. "In order to obtain lowest costs and to preserve stability of employment, the industry throughout the depression years consistently maintained production rates as far as possible during periods when sales were off," Mr. Williams stated. "In this way, the accumulating of inventories took up the slack until active demand was reestablished. With these stocks, the possible difficulty in meeting sudden new demands of expanded industry is removed.

"In the light of the demands today being placed on industries which supply needed raw materials," he continued, "another basic policy of this industry has acquired greater significance. This has been to continue, regardless of temporary general business conditions, exploration and prospecting activities to discover new reserves of sulphur. Thus the development of Freeport's Grande Ecaille mine in Louisiana, which took place in the depression years 1932 and 1933, has greatly increased our domestic supplies and reserves, contributing to the nation's present self-sufficiency. The policy of maintaining emphasis on research through the lean years as well as the good also has been an important factor. This has worked out in many different ways. Necessary improvements have been made in the basic Frasch hot-water process for mining sulphur from the deep limestone formations below the Gulf Coast. Without these improvements, such a deposit as Grande Ecaille could not be successfully operated."

Pulp Industry's Consumption

● The portion of crude sulphur taken by U. S. and Canadian pulp and paper mills has increased along with the general increase in sulphur consumption. In 1939 the pulp and paper industry consumed approximately 362,000 tons of crude sulphur, as the accompanying table shows. This rose to approximately 498,000 tons in 1940. The figure for 1941 will probably be well over 500,000 tons.

The present record-breaking sulphur requirements are being met at no advance in the base sulphur price of $16 a ton at the mines. This is a sulphur cost to the consumer, exclusive of whatever shipping charges he may have, of less than three-quarters of a cent per pound. In terms of newsprint costs, this amounts to about 36 cents per ton of paper, or at $50 per ton of newsprint, about seven-tenths of one per cent of the total.



Sulphur is mined by an unique hot water process. Melted underground by superheated water, molten sulphur is sprayed into storage vats like the one shown in the top picture to cool and solidify.

To meet today's record breaking requirements, sulphur is loaded by night at the Freeport Sulphur Company's flood-lighted dock at Port Sulphur, Louisiana.

Apparent Sulphur Consumption by the Pulp and Paper Industry

1927	393,000
1928	389,000
1929	431,000
1930	376,000
1931	284,000
1932	232,000
1933	299,000
1934	290,000
1935	304,000
1936	396,000
1937	476,000
1938	237,000
1939	362,000
1940	498,000
	4,967,000

Note: 1937 figure not truly representative of consumption as substantial sulphur shipped during that year was held over and used in 1938.

Pacific Mills Improvements To Move Slowly

● Priorities, interrupted deliveries, shortage of skilled men and materials will probably delay the expansion program being undertaken by Pacific Mills, Ltd., at Ocean Falls, B. C., for some time, although a start on some of the preliminary program has already been made.

Contracts have been distributed among a score of firms rather than placed with one general contractor, according to John H. Young, Vancouver manager.

"We are going right through the whole plant, beginning with the sawmill, and hope to effect improvements in almost every department of operation," said Mr. Young. "We hope to improve the flow of pulp and increase production, but it is difficult at this time to predict when the program will be completed. It will probably require many months, and the job may not be completed in every detail for two years."

Pacific Mills was authorized by the Canadian government to expend $585,000 on a general improvement program. The ultimate plan is to increase production of sulphite pulp from 120 tons daily to 145 tons and to step up the production of kraft from 140 to 165 tons.

The new construction is being supervised by the company's engineering department.

It is announced that work on the bleached sulphite mill will involve new storage room and screen room; wooden chlorination tower, concrete tile-lined high density bleach cells with agitating equipment; 100-ton washer, complete bleach liquor making equipment, including piping, pumps, conveyors and storage chest of 50 tons capacity.

Rayonier Completes Waste Liquor Dike

● At the end of November the earthen dike being constructed by the Grays Harbor Division of Rayonier Incorporated on Rennie Island, was completed. Waste liquor will be stored in the diked area after pumping under the Chehalis River and released on outgoing tides. Earth filled dikes were constructed 5,500 feet in length to provide the storage basis.

Puget Sound's Timber Purchase Described

President Ossian Anderson, in letter to stockholders, outlines purposes of company's acquisition of large timber reserves on Vancouver Island.

● In a letter to stockholders of the Puget Sound Pulp & Timber Company on December 22, 1941, President Ossian Anderson described the recent purchase by the company of extensive timber reserves on Vancouver Island. The official statement follows:

"Following more than a year of investigation and negotiation, Puget Sound Pulp & Timber Co. was afforded the opportunity to purchase on an extremely favorable basis in excess of 100,000 acres of the highest grade virgin timber, representing more than 4½ billion feet of all species, located in the Nimpkish Valley at Beaver Cove on Vancouver Island, British Columbia.

"This is the largest contiguous block of timber located in a valley in the Pacific Northwest.

"Log production is expected to begin in May, 1942, and before October the yield from newly acquired properties should be at the annual rate of 150,000,000 feet.

"With pulp output expanded more than 70 per cent this year, the Company has been confronted with the need for a growing amount of raw material, subjecting it to gradually tightening market conditions and constantly advancing log prices.

"This new acquisition fortifies the Company with raw material reserves and insures reasonable stability in cost of logs, the largest single component in the manufacturing cost of wood pulp.

"The Company acquired sole ownership of these excellent holdings through purchase, free and clear of any outside encumbrance, of Canadian Forest Products Limited, wholly-owned subsidiary of International Harvester Company, Chicago, and of Wood & English, Limited, Vancouver. Total purchase price for both properties was $2,000,000, an extremely favorable figure from the company's point of view.

"Wood & English Limited had expended large sums in building the initial stages of the logging enterprise into the Nimpkish Valley. Rehabilitation and enlargement of the logging program will call for approximately $500,000, making total outlay $2,500,000.

"Financing of this program was accomplished through a 5-year bank loan for $1,650,000 and by $850,000 to be furnished from the Company's funds; of the latter amount $450,000 has already been advanced and the balance will be provided over the next six months.

"The management believes that principal and interest on the bank loan can be met from liquidation of stumpage, and that as soon as the properties are put into operation they will not only be self-sustaining but offer the possibility of substantial profits to the Company in years to come."

Salem Using Ship Whistle as Warning Siren

● A huge steamship whistle, salvaged from the Evans, which was wrecked in 1933 at the mouth of the Columbia River, has been mounted on the top of Oregon Pulp and Paper Company mill at Salem, Oregon, for use as an air-raid warning signal.

"Years of Paper" Pays Tribute To Isadore Zellerbach

● A most interesting and sincere tribute to the memory of Isadore Zellerbach, late chairman of the executive committee of the Crown Zellerbach Corporation, who passed away last August is the current issue of "YEARS OF PAPER," a publication of the corporation of which Mr. Zellerbach was one of the founders, and which he headed for many years.

The booklet, which was written and compiled by William D. Welsh, of the headquarters staff of the Crown Zellerbach Corporation, is a biography, as well as tribute to Mr. Zellerbach.

It tells of the coming of Anthony Zellerbach, his wife and two sons, one of whom was Isadore, to San Francisco in 1868 from their home in Nevada County, California, where Isadore was born.

Then the story traces the growth of the Zellerbach Paper Company from its founding by Anthony Zellerbach, down through the years to the formation of the Crown Zellerbach Corporation.

Many of the pictures which embellish the booklet were furnished by Louis A. Colton, vice-president of the Zellerbach Paper Company, one of the firm's oldest employes in point of service. Also many of the reminiscences are those of Mr. Colton.

Finally at the end there is a beautiful and inspiring "appreciation" written by Mr. Welsh.

Rotameters in the Pulp and Paper Industry

by R. E. CHASE*

THE horse and buggy didn't have much on its instrument board—just a whip socket. The first auto didn't have many instruments either — we sounded the gas tank with a wire and judged the speed by the rattle. Now you sit in a luxurious 1942 model with a push-button radio on the dashboard. The first boiler had a water glass and a safety valve—you kept your eye on the glass and you knew that the pressure was up if the valve kept popping. A modern boiler house looks like a jeweler's show-window.

We all have a tendency to hanker for the good old days when life was simple. O.K.—go ahead and hanker! But the good old days are gone forever. Show me a simple old mill with very few instruments—just a few sweaty, haggard looking operators rushing around, feeling, sniffing, tasting and dashing from one valve to another, and I'll show you a mill that's about one jump ahead of the sheriff. Show me a mill with panel after panel of delicate instruments and the bright young members of a technical control department standing around tabulating chart records and I'll show you a mill that is paying dividends. There is obviously some connection.

Now the pulp and paper industry makes a solid product from solid raw materials but in so doing it employs an astounding mileage of pipe to convey an astounding tonnage of fluids. By fluids I mean water and all kinds of liquids, solutions and suspensions, steam and all kinds of vapors and air and all kinds of gases. The industry uses every conceivable kind of technical equipment to do something to these fluids.

Any instrument which makes it easier to see what is going on inside these pipes or to measure or record or control these moving fluids has got a job cut out for itself in this industry.

This is where the rotameter comes in.

How many times have you looked at a pipe and wished you knew what was going on inside? For example, suppose this little pump outfit represents a miniature pulp mill. Here is a pipe with a Saunders' valve. We start the pump but who knows what is flowing in the pipe? We give the valve a quarter turn. Does this affect the flow? Hey, Johnnie, run up in the beater room and see what happens when I juggle this valve! No—never mind. (dramatically throwing back the curtain revealing a Fischer & Porter rotameter.) It's a slightly obsolete but still widely used model of a simple indicating rotameter. Those of you who can't see it very well from where you are sitting are welcome to come up and play with it afterwards. Note the guide rod in this model which keeps the float centered. Note the patented Stabl-Vis float about which more will be said later. But I want you to see that the float instantly responds to every change in rate of flow. It is easy to read—graduations equally spaced from top to bottom—and you can see if it is clean, and you can also see the liquid in the line. Everytime you touch the valve the float changes position and everytime there is a pressure change or any other kind of a change in the liquid or its movement, you can see it. No more guesswork.

A rotameter is a glorified look-box with graduations on it (Figure 1). One moving part, the float or rotor moving up and down in a tapered tube. The tapered tube has its small end down and the flow going up. The float moves up until there is space enough around it to allow the liquid to pass. Then the float comes instantly to rest and, the tube being graduated, you can read the rate of flow.

The rotameter is only a few years old but it is developing so fast that new models are obsolete almost before descriptive literature is off the press.

Advantages of the Rotameter

● What has the rotameter got that other meters haven't got?

For purposes of comparison, the rotameter can be called a constant resistance, variable orifice meter. A float whose constant weight offers constant resistance moves up and down in a tapered tube so as to adjust the orifice or annular passage to suit the flow.

This combination of a constant resistance with a variable orifice in the rotameter leads into an entirely different set of flow mathematics from that resulting from the old fixed orifice type meter whose variable resistance was not a straight-line function of the rate of flow.

One thing the rotameter has is visibility. You can see the condition of the liquid going through it. You can see the only moving part, the float, and if it is dirty you can take it out and clean it. You can read it easily, quickly and accurately—the scale divisions being spaced equally from top to bottom. So much for visibility.

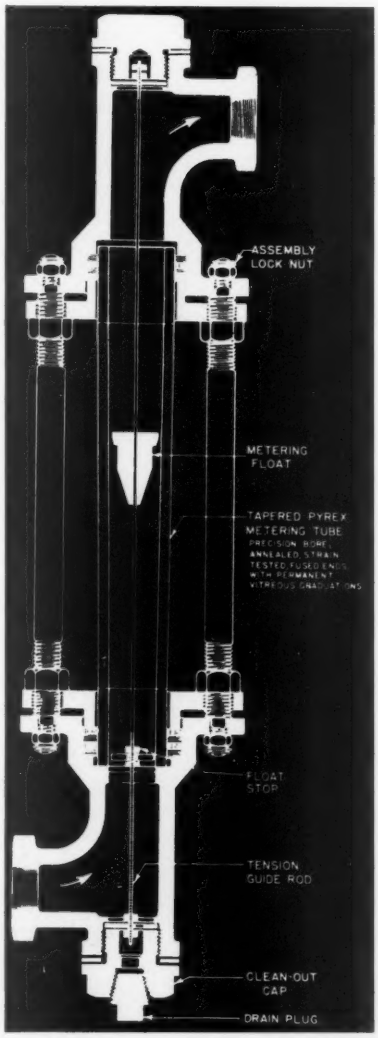
The rotameter also has adaptability. It will go almost anywhere to handle almost anything. It has a very low pressure drop and therefore makes practically no difference to pumps or blowers. It's not fussy about its position in the line like some other meters. We are not worried about eddy currents in the line. We don't have to figure so many pipe diameters from the last elbow. In fact for convenience in cleaning we generally install it with 90° elbows at top and bottom. The rotameter will go in horizontal or vertical lines or in bypasses. We've got rotameters with dashpots for pulsating flows, we have special protective cases for dangerous locations, we have special materials for strong chemicals, special construction for high pressures, special extension floats for reading opaque liquids, and we are just beginning to get into, in a big way, such applications as remote indicating, recording, integrating and controlling. This means that you can now bring the rotameter to your instrument board wherever it is located.

We are beginning to sell rotameters for dividing certain flows into varying proportions in accordance with a definite time schedule or certain process requirements. We have what we call an Accurobatch system for such purposes as sizing or consistency control. So much for adaptability.

The rotameter has **quick** accuracy. Slow accuracy isn't good enough any more. For example, the Army, the Navy, the Airforce, the aircraft manufacturers, the airline operators have adapted the Fischer & Porter rotameter in preference to weigh tanks for vital motor fuel consumption tests on engine test stands. That's about all I need to say about rotameter accuracy. Some of our guarantees run over 99%.

I think you will be interested in hearing about certain problems we had to lick in connection with aircraft fuels because you have some of the same problems.

The petroleum liquids are characterized by variations in viscosity and density and both of these variations cause metering troubles and both of these troubles have been licked by Fischer & Porter.



*R. E. Chase & Company, Tacoma, agents for Fischer & Porter Company. Presented at the meeting of the Pacific Coast Division of the American Pulp & Paper Mill Superintendents Association, Seattle, Washington, December 5th and 6th, 1941.

One Common Goal

★ ★ ★ ★ ★ ★ ★ ★ ★

As war conditions place an increasingly heavier strain on our Industrial Front, civilian curtailments and restrictions are inevitable.

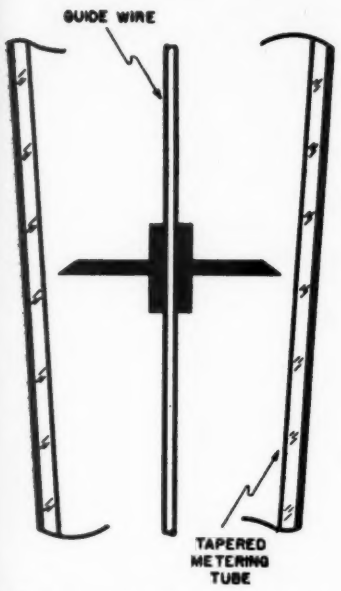
In the difficult days ahead it will be necessary for producers and consumers to bear in mind that no inconveniences or sacrifices are too great to achieve the one common goal — Victory.

RAYONIER
INCORPORATED

Better Pulps for Better Performance

Mills: Hoquiam, Port Angeles, Shelton, Tacoma, Wash. and Fernandina, Fla. • *Executive Offices*: 343 Sansome Street, San Francisco • *Sales*: 122 East 42nd Street, New York

★ ★ ★ ★ ★ ★ ★ ★ ★



Alpha type Stabl-Vis float.

Figure 2

Evolution of the Rotameter

● The adoption of the guide rod in the rotameter by Fischer & Porter led to some surprising results. Obviously it kept the float centered thus maintaining the perfect shape of the annular orifice. It also kept the float from striking the glass. But the most far-reaching effect of the guide wire was that it freed us from limitations of float design. The original float shown in Figure 1 was shaped like a plumb bob so that it would remain upright and keep itself centered in the tube. But there was the long narrow passage between plumb bob and tube through which the liquid had to squeeze. And in the act of squeezing past the plumb bob the liquid would exert viscous drag on the float. Consequently the position of the float would be different for liquids of different viscosities.

But with the guide wire we could design a float as in Figure 2. The float now has become a thin disc with a feather edge. The annular passage between the float and the tube through which the liquid must squeeze is now the space between this feather edge and the glass which has practically zero vertical distance. No distance—obviously no drag.

Consequently this float which we call the Stabl-Vis float will read the same number of gallons per minute whether the liquid is a thin one like water or a thick one like oil. Here, for example, in Figure 3 is a set of curves for a No. 5 rotameter with an old style plumb bob float. At 1.4 gpm, for example, the float would stand at a height of 120 millimeters in water, 180 millimeters in a certain oil at 120° F. and 220 millimeters in the same oil at 90° F. That's an error due to viscosity of 86%.

But suppose we use a Stabl-Vis float, Figure 4. You will see that the water and 120° oil lines practically coincide and that this oil even cooled to 77° only shows a viscous drag of 10 millimeters, reducing this error to only 7%. Obviously no operator in his right mind is going to use the same meter for water and thick oil and expect us to calibrate for both in the terms of either one. However we are now hearing rumblings of the Ultra-Stabl-Vis meter whose discharge coefficients plotted in terms of Reynolds numbers gives a perfectly straight line! I don't know what the Ultra - Stabl - Vis meter looks like — I haven't seen a picture yet, but several of them have already been sold and are handling very tough control jobs in a highly satisfactory manner.

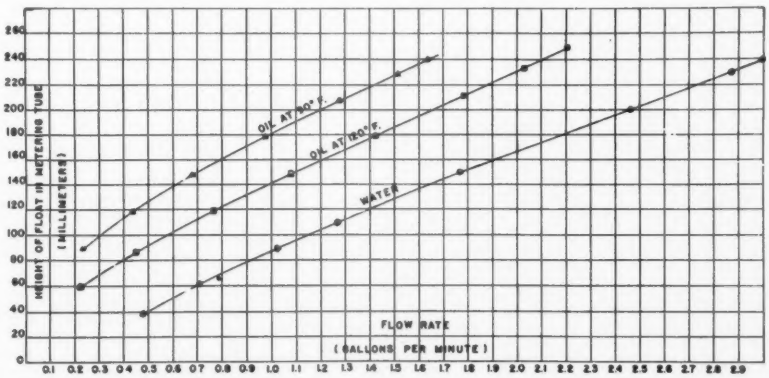
This is the kind of stuff that makes technology so exciting—that makes engineering sales work so much fun—we are really doing something when we bring such tools to modern industry!

The pulp and paper industry uses various viscous liquids, fuel oil for example and certain sizing solutions, liquid chlorine, some caustics and sulphuric acid.

I mentioned the fact that certain petroleum products have variable density. Another fascinating discovery by Fischer & Porter is that in the case of rotameters which are calibrated in weight units such as pounds per hour, instead of volumetric units like GPM, the density variations can be made to cancel out if the float is made exactly twice the specific gravity of the liquid. This can be demonstrated by mathematical reasoning and I would attempt to prove it to you here and now if I thought you could take it and if I thought I could dish it out. I am not any too handy with higher mathematics in an extemporaneous discussion. Anyway we have a plastic we call Plasmet of which we can make floats of twice the average density of almost any liquid and the operator can forget about density variations.

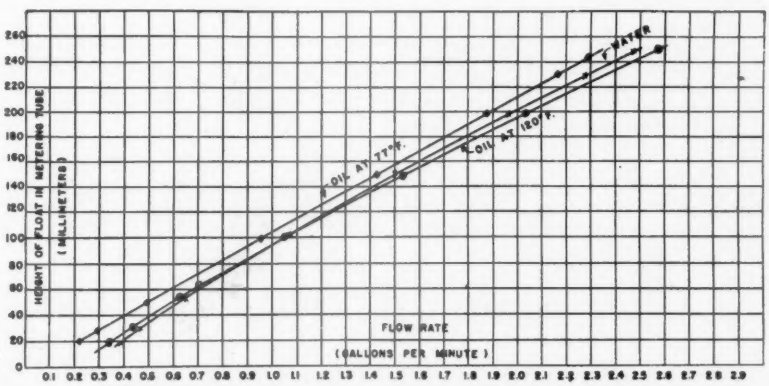
ROGER E. CHASE, Spoke on Rotameters

We can do a lot of other tricks with the guided Stabl-Vis float. For example, in Figure 5 we show an extension piece running up into an upper chamber for damping pulsations or making is possible to read the flow of an opaque liquid. Or maybe we are metering high pressure steam and make the tapered tube out of steel. The extension then



Capacity curves for size #5, ¾", rotameter with plumb-bob float.

Figure 3



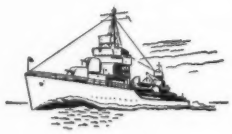
Capacity curves for size No. 5, ¾", rotameter with Stabl-Vis float.

Figure 4

WHAT'S HAPPENING TO
CHLORINE

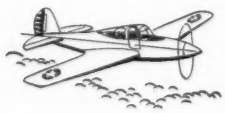
The Chemical Needed By The Paper Industry For Bleaching And Slime Control? . . . .

What's happening to Chlorine? Just this—BEAR BRAND Chlorine, in addition to being a chemical essential to the paper industry, finds vitally important applications in our national security program . . . Huge quantities are being diverted from normal channels to a wide variety of uncommon but highly significant uses. For example:



CHLORINE "Keeps 'Em Sailing"...
It is used in large quantities in the manufacture of the important corrosion resisting vinyl resins used for coating de Gaussing cables—thus providing protection for ships against magnetic mines.

CHLORINE "Keeps 'Em Rolling"...
It is used for the production of synthetic rubber and substitutes for rubber.



CHLORINE "Keeps 'Em Flying"...
It is used in the manufacture of glycol, the anti-freeze for liquid cooled airplane motors. Twenty-five thousand feet up is anything but a balmy atmosphere.

CHLORINE "Keeps 'Em Healthy"...
It is used in army camps and defense cities for purification of water supplies and for treating sewage.

Great Western is in sympathy with the paper industry's need for chlorine. However, the importance of our nation's need for this vital chemical cannot be minimized—its requirements must be met.

Chlorine production facilities at Great Western are being expanded as rapidly as possible in an effort to take care of the greatly increased demand.

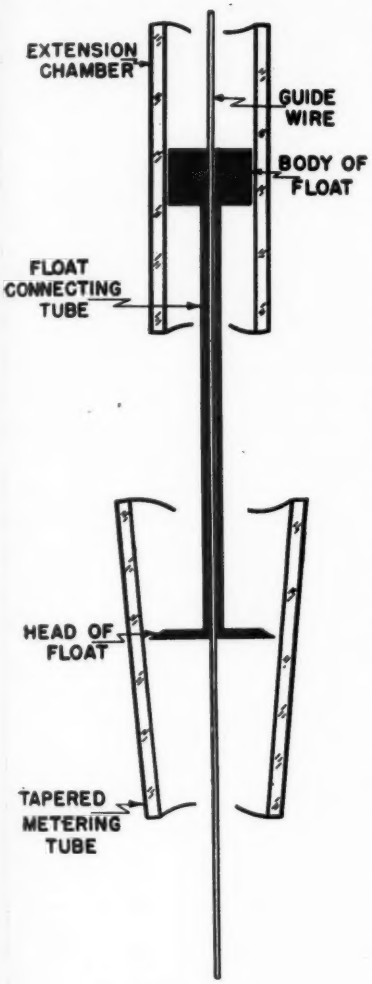
GREAT WESTERN DIVISION
THE DOW CHEMICAL COMPANY
San Francisco, California, U.S.A.

New York • Seattle • Los Angeles

GREAT WESTERN DIVISION • BEAR BRAND PRODUCTS • THE DOW CHEMICAL COMPANY

DOW

TRADE MARKS REG. U. S. PAT. OFF.



Beta type Stabl-Viz float.

Figure 5

runs into an electric transmitter coil and we get our readings on a chart.

I might mention here that it is only a few months since we brought out, with the valued assistance of some of the genius existing in the Brown Instrument Company, a transmitter with a balanced impedence coil which compensates for temperature changes. We already had viscosity and density in the bag and now temperature is captured.

Figure 6 shows a typical rotameter hooked up for remote recording or control work.

I have passed around some illustrations which will give you a better picture of the rotameter than I can paint with words.

I have also passed around a pyrex tube. Note the rifle-barrel precision of the bore. Tubes of a given size are strictly interchangeable. The manufacturing process by which these tubes are produced, tested and calibrated is very fascinating but my time is up.

What else do you want to know?Capacities? Our ¼" size starts at about 25 cc/min. and our 6" size will handle about 825 gpm of water or 1000 cfm of air. Frankly we have been so busy delivering rotameters to certain industries which are expanding rapidly, like aviation for example, that we haven't even begun to look around for big metal tube rotameters for the remote control of big jobs like waterworks and hydro-electric plants. We have been too busy measuring vitamins into cereal foods and deicing fluids to airplane wings.

In the pulp and paper industry there are all the common uses such as measuring chlorine, bleach, alum, size, fuel oil, boiler-water treatment, blow-down, sulphur dioxide and the like. You grabbed the rotameter while it was still in diapers. A lot of the early crude installations are still giving satisfaction. Now that the rotameter has grown up and received a college education it is going to be put to work at more complicated tasks. Your guess is better than mine because you are the boys who have the problems. All I can say is that the rotameter is certain to be employed for the purpose of helping you maintain the standards of product quality and process efficiency towards which you are aiming.

The Superintendent's Association is organized for the good of the industry. One way to help the industry is to bring our problems out on the floor of a meeting like this and discuss them. It would seem to me like an excellent idea to give those here who care to do so a chance to stand up and talk over their experiences and problems relating to fluid control. If I can help in this in any way, I will be very happy.

Canadian Pulp, Paper Exports Up In 1941

● Final figures on export of pulp and paper from Canada last year are expected to show an aggregate trade of about $260,000,000, contrasting with $231,800,000 in 1940.

This represents one of the biggest years in the history of the industry both in respect to dollar value and volume of tonnage.

British Columbia mills enjoyed a relative increase; in fact, it would not be surprising if, when all the returns are in, it was shown that the increase for British Columbia was greater than in the eastern pulp and paper manufacturing provinces.

Powell River Company and Pacific Mills, Ltd., the two newsprint producers, operated at peak of capacity practically all year. Pacific Mills continued its production of kraft and other paper as well as pulp on a large scale, and Powell River Company, with plans already under way for substantial expansion in that department, increased its output of unbleached sulphite pulp.

British Columbia Pulp & Paper Company's two mills—at Woodfibre and Port Alice—maintained full operating schedule in rayon and bleached sulphite pulps, and Sorg Pulp Company, acquired during the year from Port Mellon Operating Company (Leadbetter) resumed production at the rate of about 80 tons daily. The capacity will be doubled when the $1,000,000 construction program already started is completed some time this year.

In addition, Sidney Roofing & Paper Company and Westminster Paper Mills ran their plants close to capacity, the latter taking steps during the year to bring about a further increase in tonnage.

The past year has been an exceptional one for the pulp and paper industry throughout Canada. Not only has there been a sharp rise in domestic demand, but most of the world's democracies have come to depend on Canada for all or part of their pulp and paper supplies.

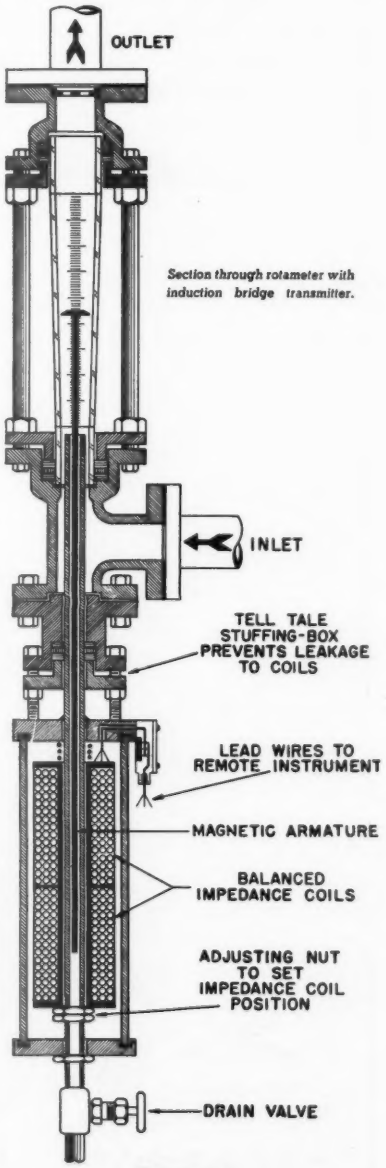
The situation applies with particular force to newsprint, which is Canada's second largest export item, led only by gold, but also to the numerous other pulp and paper products of Canada's mills.

Demand for woodpulp has been particularly heavy, as also has been the case for insulating board, kraft papers, etc.

Estimated value of pulp and paper exports from Canada in 1941, with comparative figures for 1940, follow:

	1941	1940
Newsprint	$155,000,000	$151,360,196
Board	10,000,000	8,423,574
Other paper	15,000,000	11,095,756
Wood pulp	80,000,000	60,930,149

Last year the United States increased its purchases of Canadian newsprint paper, and much heavier shipments were



Section through rotameter with induction bridge transmitter.

Figure 6

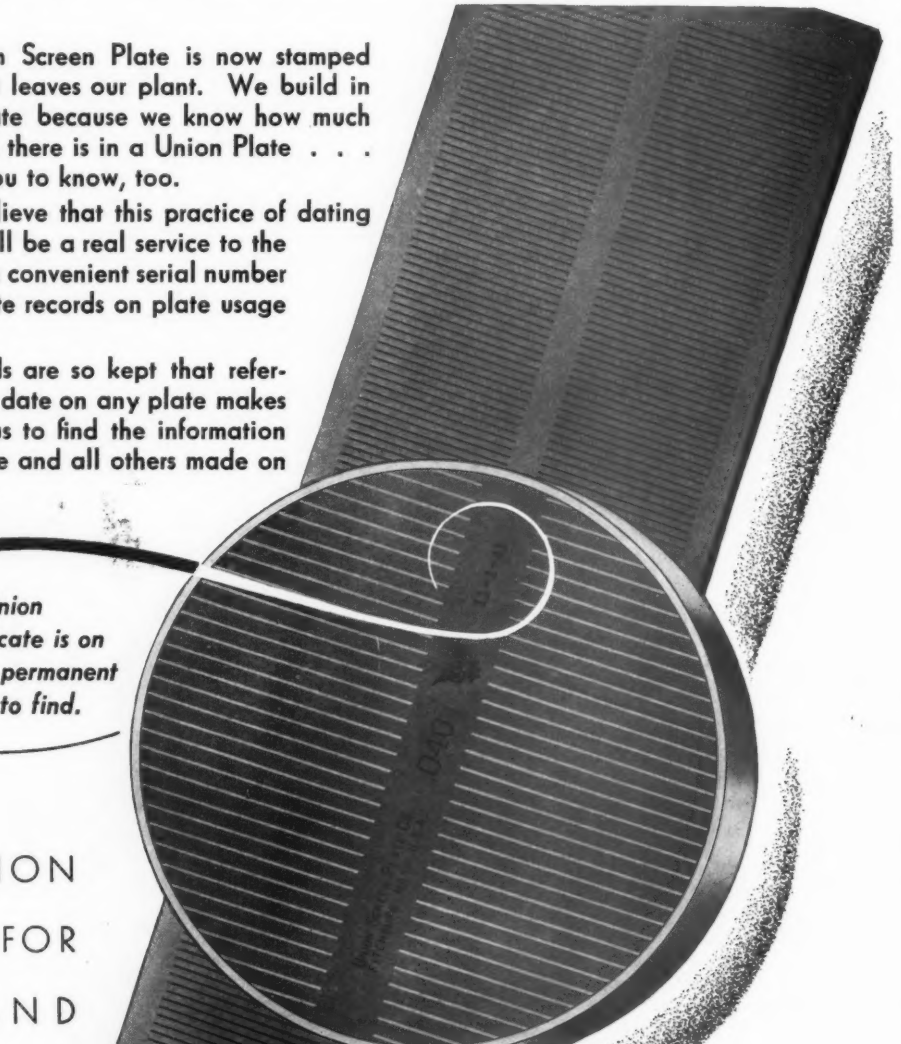
A BIRTH CERTIFICATE BUILT IN

Every Union Screen Plate is now stamped with the date it leaves our plant. We build in a Birth Certificate because we know how much quality and life there is in a Union Plate . . . and we want you to know, too.

And we believe that this practice of dating Union Plates will be a real service to the mill. It makes a convenient serial number for more accurate records on plate usage and life.

Our records are so kept that reference to just the date on any plate makes it possible for us to find the information about that plate and all others made on the same order.

The Union Birth Certificate is on every plate, permanent and easy to find.



BUY UNION PLATES FOR LIFE AND SERVICE

UNION SCREEN PLATE COMPANY

FITCHBURG, MASS.

(Associated with Union Machine Co.)

Pacific Representative

Pacific Coast Supply Company

Pittock Block, Portland, Ore. **343 Sansome Street, San Francisco, Calif.** **White Building, Seattle, Wash.**

also made to Argentine, Brazil, Chile, Peru, Mexico and other markets. Considerable tonnage went to Australia, New Zealand, the United Kingdom, British India and other parts of the British Empire.

With the exception of the United States, which has a domestic production of about 1,000,000 tons or a little better than 25 per cent of requirements, every country in the world outside the Axis influence depends on Canadian-made newsprint.

One of the principal fields for expansion for the industry has been in insulating and building boards, and in British Columbia, officials of Sidney Roofing & Paper Company report that this demand has been an influence in substantial increase of production on this coast. The same company entered the field of blackout paper production late in the year. Powell River Company discovered that its new heavy paper wrap for newsprint was also suitable for blackout purposes, and sold a considerable quantity for that account.

Construction of barracks and other military and naval buildings has required a tremendous tonnage of insulating and building board, and Pacific coast mills have assisted in meeting the requirements.

Exports of Canadian insulating and building boards were valued at about $10,000,000 last year. Before the war exports of these grades were negligible.

Pulp exports from British Columbia and other Canadian mills have benefitted from the blockade of northern European producing areas. For the first nine months of last year the United States alone increased imports of Canadian pulp by 25 per cent. Chemical grades figured largely in this trade, as domestic sources of groundwood pulp were adequate for most purposes.

While no exact figures are available, it is estimated that well over 80 per cent of the foreign exchange accruing to Canada from the export sale of pulp and paper products last year was in the form of United States dollars.

Vic Gault Instructing Safety Classes at Longview

● V. C. Gault, personnel supervisor, Crown Willamette Paper Company, Division of Crown Zellerbach Corporation, Camas, Washington, is instructing a class of safety engineering at Longview. Classes are sponsored by the committee for the conservation of manpower in defense industries, under the Department of Labor, through the University of Washington.

Classes meet every Tuesday in the R. A. Long high school. These were begun on November 18th and are to continue for 36 weeks. Thirty-five enrollees attend, representing Long-Bell Lumber Company, Weyerhaeuser Timber Company, Longview Fibre Company, PUD, the state department of labor and other logging and lumbering firms.

Jackson Named Timber Manager for Pacific Mills

● T. B. Jackson, for eight years superintendent of the Crown Zellerbach operations in Clatsop County, Oregon, was transferred early in November to Vancouver, B. C., as resident manager of the timber department of Pacific Mills, Limited, subsidiary of Crown Zellerbach Corporation.

Pulp Stocks Down to 80,000 Tons

● Stocks of wood pulp at domestic producing mills are at a low level, according to the monthly report of the United States Pulp Producers Association, which reveals that at the end of November last total stocks of all the pulp mills in this country reporting to the Association amounted to only 79,611 short tons, air dry weight, of all classes of pulp except soda pulp, semi-chemical and off-quality pulps.

The figures issued by the Association do not include those of all pulp mills in this country, but they do take in the great majority of producing mills. That stocks are steadily declining is revealed by a comparison with figures for a few months ago; for example, at the end of June last total stock amounted to 133,441 tons, while at the end of February last year they were 159,623 tons.

Stocks at the close of last November were 21,064 short tons of bleached sulphite, 100 per cent of the mills of the country reporting; 16,288 tons of unbleached sulphite, 95 per cent of all the mills reporting; 13,957 tons of sulphate pulp, 96 per cent of the mills reporting, and 28,302 tons of ground wood, 67 per cent of the mills reporting.

Hawley Provides Employees With Identification Cards

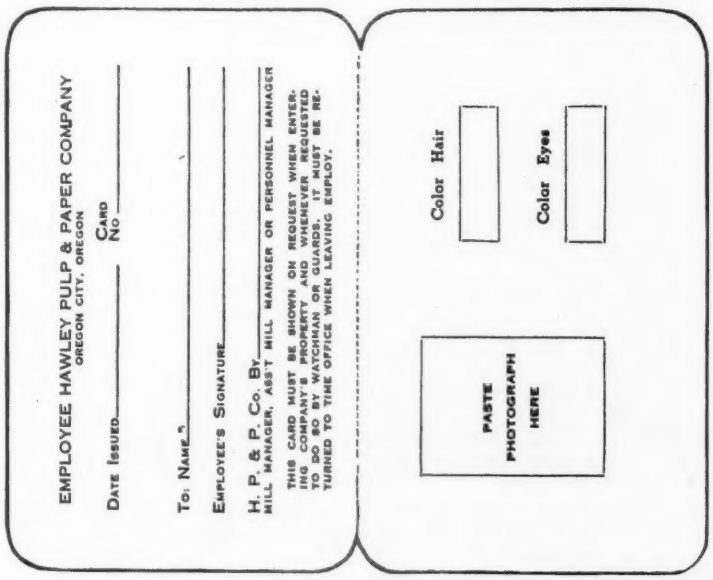
● The Hawley Pulp and Paper Company, Oregon City, Oregon, was one of the first mills of the Pacific Coast industry to provide all of its employees with photographic identification cards, following the Japanese attack on the United States. Other precautions taken at the plant includes additional guards and watchmen service. The entire mill has been blacked-out so the manufacture of pulp and paper can continue without interruption despite attack.

Carl E. Braun, vice president and mill manager, states that "fire squads are being organized for each department of the mill and sand bags are strategically placed around the plant."

The photo-identification cards were provided by the company without cost to the employees, the company setting up its own and employee-owned photographic equipment for taking the pictures. Each worker signed his name on a small blackboard, which was placed in a frame directly in front of him, then a picture was taken, which not only registered the features of the employee, but also his signature and his height. There was a standard on the wall, directly behind the individual who was photographed, measured off in feet and inches, so one's height was registered on the photograph.

Harold Lent, foreman of the sales promotion department, was in charge of the photographing of the employees.

Mr. Braun says buttons will be made for the employees in the near future and will be worn by all workers while at the plant and turned in at the timekeeper's office at the end of the shift.


EMPLOYEE HAWLEY PULP & PAPER COMPANY
OREGON CITY, OREGON
CARD NO
DATE ISSUED
TO: NAME
EMPLOYEE'S SIGNATURE
H. P. & P. CO. BY
MILL MANAGER, ASS'T MILL MANAGER OR PERSONNEL MANAGER
THIS CARD MUST BE SHOWN ON REQUEST WHEN ENTERING COMPANY'S PROPERTY AND WHENEVER REQUESTED TO DO SO BY WATCHMAN OR GUARD. IT MUST BE RETURNED TO TIME OFFICE WHEN LEAVING EMPLOY.
COLOR HAIR
COLOR EYES
PASTE PHOTOGRAPH HERE

IMPCO

VACUUM SAVEALLS

at the—

HAWLEY PULP &

MAKERS OF
THE FOLLOWING MACHINES
FOR THE PAPER INDUSTRY

ROTARY AND FLAT SCREEN KNOTTERS • CENTRIFUGAL SCREENS • FLAT SCREENS • WITH DUNBAR DRIVE (METAL OR CYPRESS VATS) • VACUUM FILTERS, INCLUDING SAVEALLS, WASHERS, HIGH DENSITY THICKENERS • LIME SLUDGE FILTERS • BLACK LIQUOR WASHERS • FORMING CYLINDERS • MULTIPLE STAGE COUNTER-CURRENT PAPER STOCK WASHERS • DECKERS • WET MACHINES • INCLUDING HYDRAULIC WITH HIGH DENSITY VACUUM WET END • THORNE BLEACHING EQUIPMENT • PNEUMATIC WATER FILTERS

• THE IMPCO LINE •
OF "IMPROVED" EQUIPMENT IS ASSISTING IN THE ECONOMICAL PRODUCTION OF QUALITY PULP AND PAPERS

At the HAWLEY PULP & PAPER CO., Oregon City, Ore., producers of newsprint and other groundwood and sulphite papers, "IMPCO" equipment has long played an important part in production.

Above is one of the two "IMPCO" Vacuum Savealls installed in 1939. It recovers from 95 to 98% of the fiber in white water from No. 2 machine producing 10-lb. tissue. The 5 x 12-ft. drum operates at variable speeds in a copper lined vat. OPPOSITE are three "IMPCO" Type 5 Centrifugal Groundwood Screens installed in 1928 and one Design No. 3 tailing screen. The Type 5 screens have required practically no maintenance other than new screen plates.

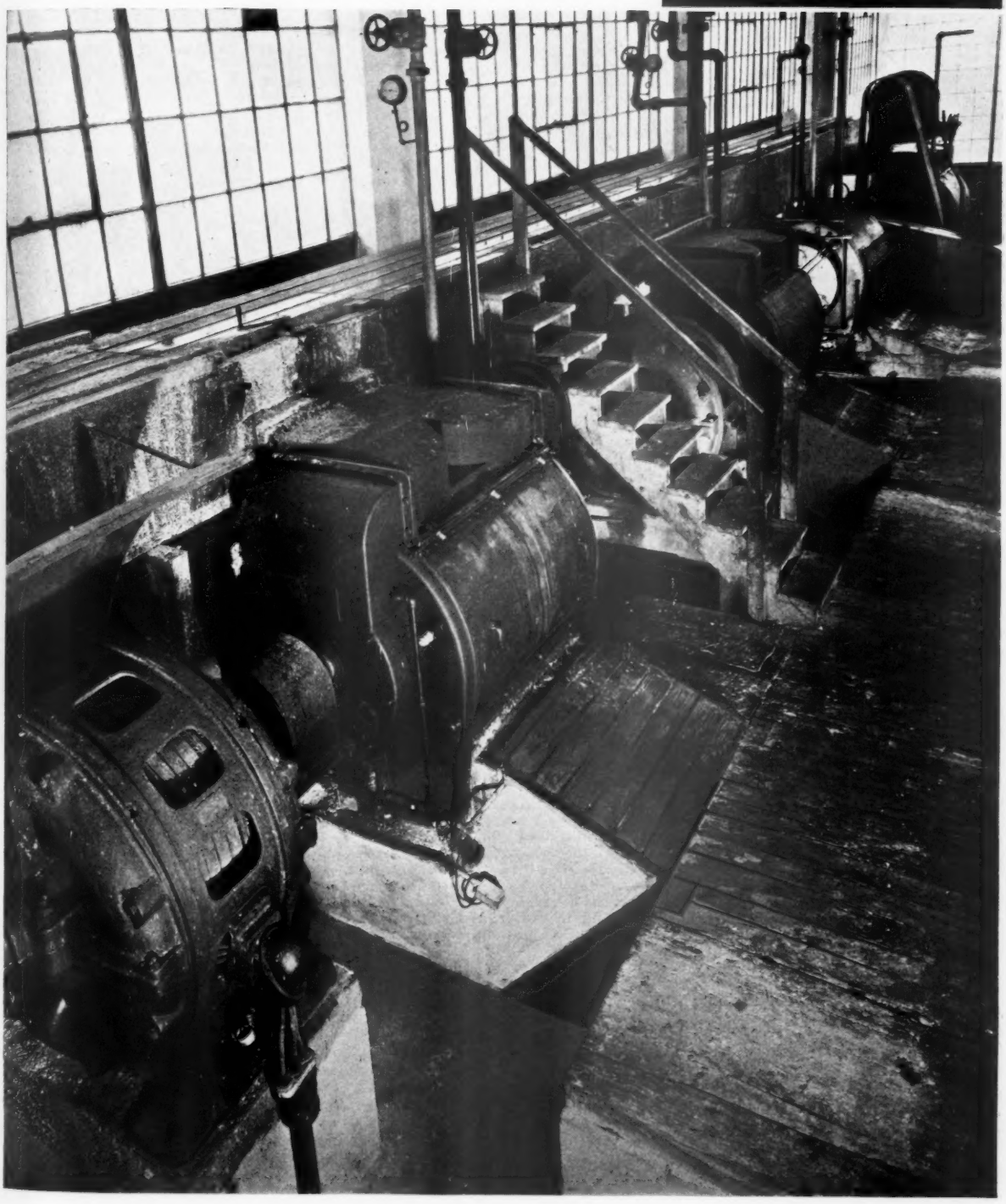
"IMPCO" EQUIPMENT is DESIGNED and BUILT for EFFICIENT, TROUBLE-FREE SERVICE.

IMPROVED PAPER MACHINERY CORP.

NASHUA • NEW HAMPSHIRE

GROUNDWOOD SCREENS

PAPER COMPANY



Trade Talk

of Those Who Sell Paper in the Western States

BM&T Men Hold Sales Meeting

● Sales managers and buyers from each of the Blake, Moffitt & Towne divisions attended the annual meeting held in San Francisco on December 8, 9 and 10.

The sessions opened with a message of greeting and welcome by Mr. J. K. Moffitt, president of the company, to the visitors who had come from all sections of the Pacific coast. Following this, Mr. O. W. Mielke, general manager of the company, as chairman, led discussion on subjects of major importance in the business of paper distribution. Buyers and sales managers exchanged ideas and experiences in light of today's problems looking toward the maintenance of maximum service to paper buyers and cooperation in the industry demands of national defense.

Highlight of the meeting was a dinner dance given for the visitors and their wives on the evening of December 9 at one of San Francisco's theater restaurants.

Ansel Ernst Recovery From Appendectomy

● Ansel A. Ernst, Los Anegels representative of the Everett Pulp & Paper Company, Everett, Washington, and treasurer of the Paper Mill Men's Club of Southern California, was taken to Monte Sano Hospital in Los Angeles on the double-quick at midnight of December 19th for an appendectomy. Reports from the hospital a few days later showed that "Ans" was well along Recovery Road, giving every indication that he'll be back at his desk within the normal period. His record of "on duty" service is rather remarkable: in 32 years with Everett Pulp & Paper, he's missed only three days due to illness—and they practically had to tie him in bed during a flu epidemic to keep him away from his desk.

OPM to Watch Government Paper Purchases

● On December 8th, Douglas MacKeachie, director of the purchases division of OPM, annouced the appointment of Robert Porter of Philadelphia and his assignment to the equipment and supplies procurement branch in charge of paper procurement. Mr. Porter is purchasing director for Provident Trust Company of Philadelphia where he has for many years made a study of simplification and conservation practices in the procurement of paper.

He will carry on similar work for OPM in connection with paper purchases by government agencies and will also advise on inventory controls made necessary by a wave of advanced buying of paper which has been going on in both industry and government.

Everett Men Attend Sales Conference

● R. A. Gates, manager of the San Francisco office of the Everett Pulp & Paper Company and John E. Horton, salesman in the stationery department of the same office attended the general sales meeting of the company at Everett, December 1-6, and also inspected the handsome new office building of the company, recently opened.

Mrs. Palm Instructs On Package Wrapping

● Mrs. Glory Palm of the advertising department, Zellerbach Paper Company, San Francisco, recently addressed the thousand girl students of Girls' High School of that city on Christmas package wrapping. Mrs. Palm was assisted by Miss Agnes Furlong, another Zellerbach expert in wrapping packages originally and attractively.

Paper Mill Men's Club Holds Sixth Boy's Christmas Party

● Even though they celebrated Christmas a week early, members of the Paper Mill Men's Club of Southern California enjoyed as genuine a Yuletide on December 18th as they did on the 25th. For it was on the former date that they honored the Red Shield Club of the Salvation Army boys with their Sixth Annual Christmas Party, at Carl's View Park restaurant in Los Angeles.

Some seventy-five members of the club gathered with 25 lads ranging in age from eight to twelve years to enliven the Christmas season for the underprivileged youngsters, and as well to experience for themselves the truth that "it is better to give than to receive."

A handsome Christmas tree laden down with several gifts for every youngster, a real turkey dinner "with all the fixin's," entertainment that included legerdemain and other features, the winning of the swell bicycle prize, and the presentation, on behalf of Club members, of a woodworking set which included lathe, drill press, jig saw and related tools, were features of the annual Christmas party which more than anything else has won the Club an enviable reputation among businessmen's organizations.

On the Opposite Page . . . Both big and little boys have fun at the Paper Mill Men's Christmas Party.

Little BOBBY SALMON, eight years old and smallest member of the Red Shield Club, was the lucky ticket holder at the drawing for the prize bicycle. He rode it in the dining room, proudly proving he was just the man for it. At the right is GEORGE WIEMAN, holding the ticket bowl. Carl's hostess, Dixie Wurst, drew the winning ticket.

One of the entertainment acts most fascinating to the youngsters was Walter Preston's magic. Here Preston "and Company" includes a youthful aide from the audience who smilingly holds a rope which, when cut into three pieces, remarkably returned to its single length at the end of the trick.

General view of the 6th Annual Christmas Party of the Red Shield Club of the Salvation Army, December 18th at Carl's View Park Restaurant, Los Angeles, by the PAPER MILL MEN'S CLUB of SOUTHERN CALIFORNIA. Seventy-five men were hosts to 25 boys.

BOB SPENCER, genial master of ceremonies and one of the owners of the restaurant, contributed his share along with the Paper Mill Men's Club toward enjoyment of the Christmas party by donating house facilities. In recent years Mr. Spencer has joined the PMMC in this splendid Yule gesture.

When magician Preston started pulling real, live goldfish out of the kids' ears, the boys couldn't contain themselves any longer at the tables and rushed headlong to a close point of vantage right under the stage. Even at such close range the boys couldn't figure out the tricks, and neither could the older "boys" who remained at the table.

Oakland Division Of BM&T Expands

● J. L. O'Connell, manager of Blake, Moffitt & Towne's Okland Division, has announced the addition of a new section to the company's local warehouse. Upon its completion the building will occupy the full block between Fifth and Sixth Streets on Webster.

Cement foundation blocks have been poured and work is expected to be finished by December 15. Expansion of present facilities is in keeping with the rapid strides Blake, Moffitt & Towne has achieved in serving metropolitan Oakland and its outlying districts.

Kay Honored For Citizenship

● C. J. Kay, president of Columbia Paper Company, Vancouver, B. C., was selected as the recipient of the Good Citizenship Medal annually presented by the Native Sons of British Columbia.

Mr. Kay, who has made his home in British Columbia for thirty years, founded the Columbia Paper Company in Vancouver a quarter century ago.

For 15 years Mr. Kay has been a director of the Y.M.C.A. in Vancouver and he has been a prominent figure in the city's church activities.

Mullholland and Reid Join Carpenter Staff

● James B. Mullholland, well known in the San Francisco paper industry, and Ralph F. Reid, formerly with the Sales Service Co., have joined the sales staff of the Carpenter Paper Company, San Francisco branch.

In the top picture . . . A handsome Christmas tree loaded with gifts occupied one corner of the dining room. After several helpings of Christmas turkey, the lads, responding to their names, came forward to receive gifts. GERRY THIEM, Christmas Party Chairman, is seen at the left. Then comes one of the lucky lads, CHET GUNTHER and BILL CHARBONNEAU. HORACE GIBSON was co-chairman of the party.

On behalf of the Salvation Army, Adjutant HARRY L. LARSEN accepts a woodworking set being presented by LESTER E. REMMERS, President of the Paper Mill Men's Club, to the Red Shield Club. The set included a jig saw, lathe, motor, drill press and related tools. It will be installed at the club headquarters for use by all Red Shield Club members. Other PMMC officers who worked out details of the party are PAUL RAAB, Vice President; DWIGHT TUDOR, Secretary, and ANSEL A. ERNST, Treasurer.

In the lower picture, ROBERT DICK, head of the Red Shield Club, did a graceful job of expressing thanks (with the help of the boys who chorused the words). He had a big job for every boy received a woolen sweater, a dollar bill to buy a gift, and either a baseball glove or a football, roller skates and the use of the woodworking equipment, not to mention a chance on the bike.

Chemical Studies of Sulfite Waste Liquor Pollution of Sea Water

Part II

by H. K. BENSON, K. A. KOBE, and R. H. SCOTT*

IN a previous article[1] was described the analytical procedure for measuring the pollution of Bellingham and Fidalgo Bays by the effluents of pulp mills. In additon to the testings of samples from various stations under diverse conditions, two other studies were undertaken. The first showed the spread of sulfite liquor from the Anacortes mill into Fidalgo Bay. The second was the observation, during complete tidal cycles, of waters passing certain established lines which extended from shore to shore and which constituted, in effect, gateways to other areas.

Spread of Sulfite Waste Liquor Into Fidalgo Bay

● The introduction of water of different density and composition into water bodies is often noticeable to an observer especially from a distance or at some height. Where rivers enter marine bays or where fresh water from municipal sewage works or industrial plants is discharged from sewers. segregation from sea water may be observed.

Usually, during an ebb tide in Fidalgo Bay, there is apparent to the naked eye, a current of dark colored water running out of the bay around the land head into Guemes Channel, where it follows close to the shore until the dark color soon dissipates into the natural color of the sea water. On a bright day, there is a sharp line of demarcation between the dark water and the clear water ebbing westward through the channel. While the tide is flooding, any visible darkening of the water is confined to the northwest corner of Fidalgo Bay. Repeated observation of these conditions influenced the investigators to undertake a chemical measurement of the spread of S.W.L. from the Anacortes mill on opposite phases of the tide.

In the case of the Bellingham mill, the extent of water affected was studied and depicted by dissolved oxygen contours. (See Figs. 1 and 2, Part I, December, 1941, issue.) The subsequent introduction of a specific test for S.W.L. however, made possible the determination of a truer picture. The Pearl-Benson test was used exclusively in the study of Anacortes Harbor.

Between November 18, 1940, and January 6, 1941, twenty-two samples were taken at each of several stations located in Fidalgo Bay in the vicinity of the pulp mill. On other occasions, these waters were sampled every 200 to 300 feet in courses running parallel to the shore lines. Due to the fact that there is an intermittent flow of S.W.L. into the bay from the mill's two digesters, it was impossible to obtain fixed concentrations of waste liquor at a given position in the harbor at a designated time during a flood or an ebb tide. However, from the record of times of digester blows and from the times of low and high tides on the dates sampled, it was possible to assign to each station a certain range of values for an average condition of tide and for an average of time elapsed after a digester blow. During a flood tide these conditions were an interval of two hours and eight minutes after the blow with an average completion of six tenths of the flood tide. During an ebb tide the ranges of conditions were fixed at an average of five tenths completion of the the tide and an average of two hours and forty-four minutes lapse from the time of digester blow. When the S.W.L. data for these average conditions of time and tide were plotted on a chart of the Fidalgo Bay region, it was found that certain ranges of values fell in certain sections of the bay. Thus it was possible to draw contour lines representing zones of varying concentrations. In Fig. 9 are depicted such zones as they occur during a flood tide and the ranges of concentrations that may be expected to be found within them. The conclusion is that S.W.L. is confined to the upper corner of Fidalgo Bay while the tide is rising. The manner in which the waste liquor, released from this part of the bay during ebb tide, runs as a tongue-like current into Guemes Channel is shown in Fig. 10. In both charts, the outer contour line was plotted to indicate the limit beyond which S.W.L. was not detected during the course of the investigation. Like in the Bellingham harbor studies, it is shown that in the vicinity of the mill there is pollution from the mill effluent but elsewhere in Fidalgo harbor it has disappeared or is diluted to less than ten parts per million.

Tidal Cycle Studies

● The summer of 1940 and the period of time from February to May, 1941, were spent in studies of tidal cycles. A tidal cycle study may be defined as the sampling of waters passing a given station during one cycle of tide, e.g., from one high tide to the following high tide. In this work four to five stations were established on lines across three different entrances to bodies of water under investigation. The locations of these tidal cycle stations or "gateways" are illustrated in Fig. 11. Each line of stations will be considered separately.

Tidal Cycle Study I

● Five stations were established on a course across Bellingham Bay from Commercial Point to Point Frances. Across this line or through this "gateway" must flow all waters entering or leaving the Bellingham pulp mill region. The complete analyses for a tidal cycle at this line appear in Table III. Examination of these data fails to indicate any definite trends toward increase or decrease in pollution as the tides ebb and flood. Analytical values of the bottom samples appear to be affected but little during the entire cycle. On the surface, pH variations are not appreciable and temperatures are reasonably constant. Large S. W.L. concentrations are invariably accompanied by increased oxygen consumed values. The extreme differences between bottom and surface data in oxygen consumed are not to be ascribed to the presence on the surface of S.W.L. alone. A certain amount of sewage from the city of Bellingham must also be a contributing factor. Furthermore, plankton activity increases the organic content of sea water at this time of the year as shown by higher dissolved oxygen values due to photosynthesis.

Early in this cycle, at high tide, lower salinities and higher pollution existed at Commercial Pt. than at Pt. Frances. The same is true at low tide. However, near the second high tide, salinities are lower on the west side of the bay. Though pollution values have increased at Pt. Frances by the second high tide, they are still less than those at Commercial Pt. A reasonable conclusion to be drawn from these facts is that polluted water ran from the vicinity of Commercial Pt., during ebb tide, to an area south of Pt. Frances off Lummi Island, then returned on the flood in a diluted state to the neighborhood of Station 5, showing values of 20 p.p.m. of S.W.L. and 7.84 mg/l of oxygen consumed. At the end of the flood tide at Commercial Pt. the salinity has risen to 28.27, indicating that water of higher salinity has probably flowed north to mix with polluted water at Station 1. This would explain the reduction of S.W.L. to 30 p.p.m. and oxygen consumed to 8.56 mg/l at Station 1.

Tidal Cycle Study II

● A course from Williams Point to Clark Point was chosen for a tidal cycle investigation in order to cover the possibility of S.W.L. being borne by the tides from Bellingham Bay into Padilla Bay. The analytical results obtained from the cycle of February 28, 1941, are given in Table IV. In contradistinction to the previously discussed tidal cycle, this study shows that the characteristics of the sea water remain remarkably constant, a few exceptions appearing in the oxygen consumed data. These values are only slightly above normal and must be attributed to sea water organisms, since no

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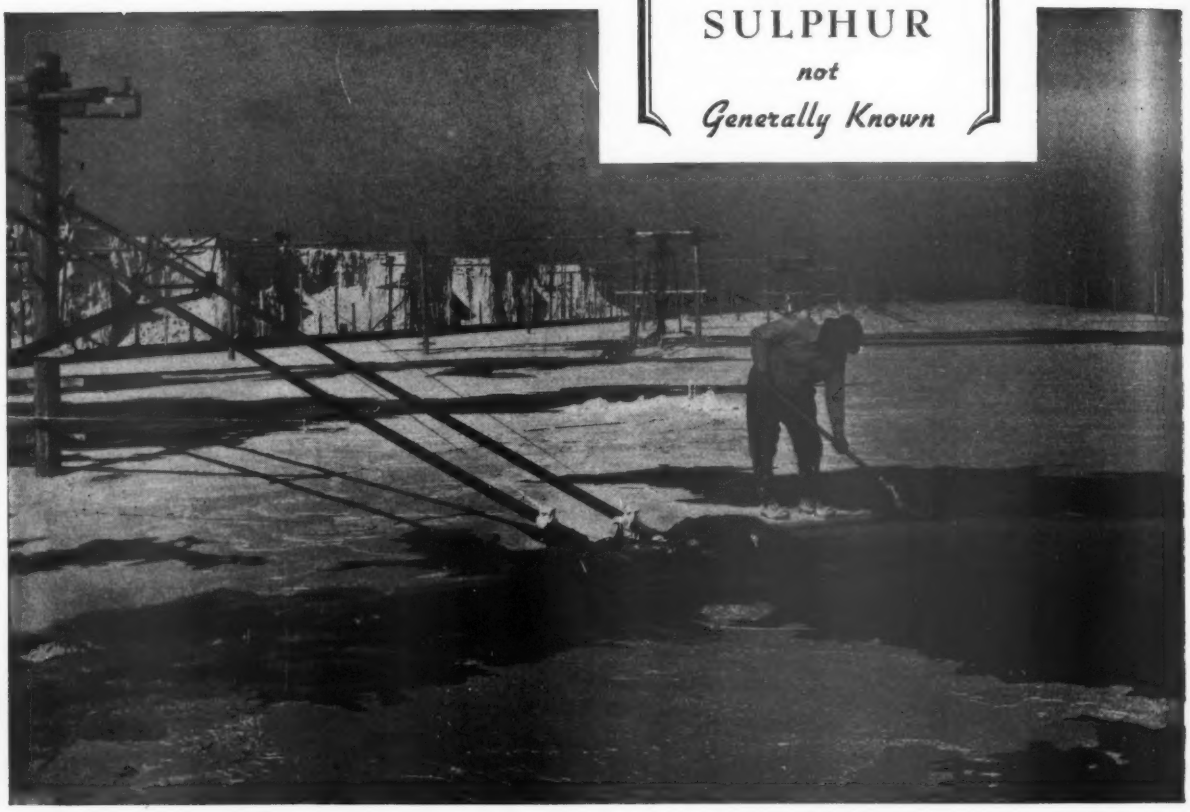
***Chemist, Puget Sound Pulp & Timber Co., Bellingham, Wash.

[1]Benson, H. K., Kobe, K. A., and Scott, R. H. Pac. Pulp and Pap. Ind., Vol. 15, No. 12: 29-47 (1941).

Interesting Facts about SULPHUR *not Generally Known*



Hot Pockets

The hot molten Sulphur as it flows from the mine is pumped to storage vats and allowed to cool. There a series of double discharge lines with swivel joints permits the uniform distribution of the molten Sulphur in thin layers over the top of the vat—an area of nearly six acres. ★ Sulphur conducts heat but slowly and, if it were not properly distributed, pools or pockets of liquid Sulphur would be covered by a crust, formed as a consequence of temporary differences in cooling rate. Such pockets, enclosed in solid Sulphur, might still contain liquid Sulphur at the end of a year or more. As a safety measure, special care is used to prevent the formation of such pockets. ★ Nearly three million tons of Sulphur or one and two-third times the entire demand of American industry in 1940 are in stock at the mine.

TEXAS GULF SULPHUR CO.
75 E. 45th Street New York City
Mines: Newgulf and Long Point, Texas

I-TG-2

S.W.L. was found at any time during the tidal cycle. It is evident that either waste from the Bellingham mill must be diluted beyond detectable concentrations before reaching this line or the water from that area ebbs more westward than southward.

Tidal Cycle Study III

● In the course laid out from Guemes Island to Hat Island and March Pt. there are four stations which form a "gateway" between Fidalgo and Padilla Bays. The only station which shows any real tendency toward change in characteristics (see Table V) is No. 4 in the shallow water of Swinomish Channel off March Pt. Here, a definite influence of fresh water is noted, especially at low tide. Evidence of this is found in lowered salinities, higher dissolved oxygen values and lower temperatures, which conditions are due to the fact that a large source of fresh, cold water, the Skagit River, empties near the southern end of Swinomish Channel. This and the phenomonon that tides flow northward in this small channel for more than half of the time account for a dilution of Padilla Bay water. The data shows that this dilution effect extends also to Station 3 and Station 2, but not to Station 1. The foregoing facts and the evidence that S.W.L. was at no time detected during the tidal cycle lead to the conclusion that at these stations the waters are affected more by Padilla Bay and Swinomish Channel than by Fidalgo bay and Anacortes harbor.

General Discussion

● In Part I of this paper, the first field work described was that of dissolved oxygen studies. With a basis of a minimum requirement of 5.00 p.p.m. of dissolved oxygen set by the State Pollutions Board[2], contours were prepared showing typical conditions of pollution in Bellingham Bay for low and high tides. It is expected, of course, that the sizes and shapes of these affected areas would vary constantly. However, the portion of the bay considered polluted is comparatively small. Other studies were made of established stations between Bellingham and Anacortes. It is shown that only two stations, those nearest the pulp mills suffer dangerous oxygen depletions. One other comparison illustrated how dissolved oxygen values in the pulp mill regions were no lower than concentrations in waters around the distant San Juan Islands.

For the established stations, many tests were run on each sample. Most notable was the colorimetric test which was specific for S.W.L. Many other confirmatory tests were conducted, but it was pointed out that they varied with the season of the year. It was, however, shown by comparison against simultaneous reference samples of unquestioned purity, that all the pollution in the water under investigation was not due to sulfite waste liquor.

When the spread of waste liquor from the Anacortes mill in Fidalgo Bay was studied (Part II), the use of dissolved oxygen contours was discarded in favor of the specific test for S.W.L. The charts of actual contours of waste liquor concentrations gave a much clearer picture. In brief, the results showed that the upper end of Fidalgo Bay served as a reservoir for S.W.L. during a flood tide, and that the waste liquor, during ebb tide, rushed

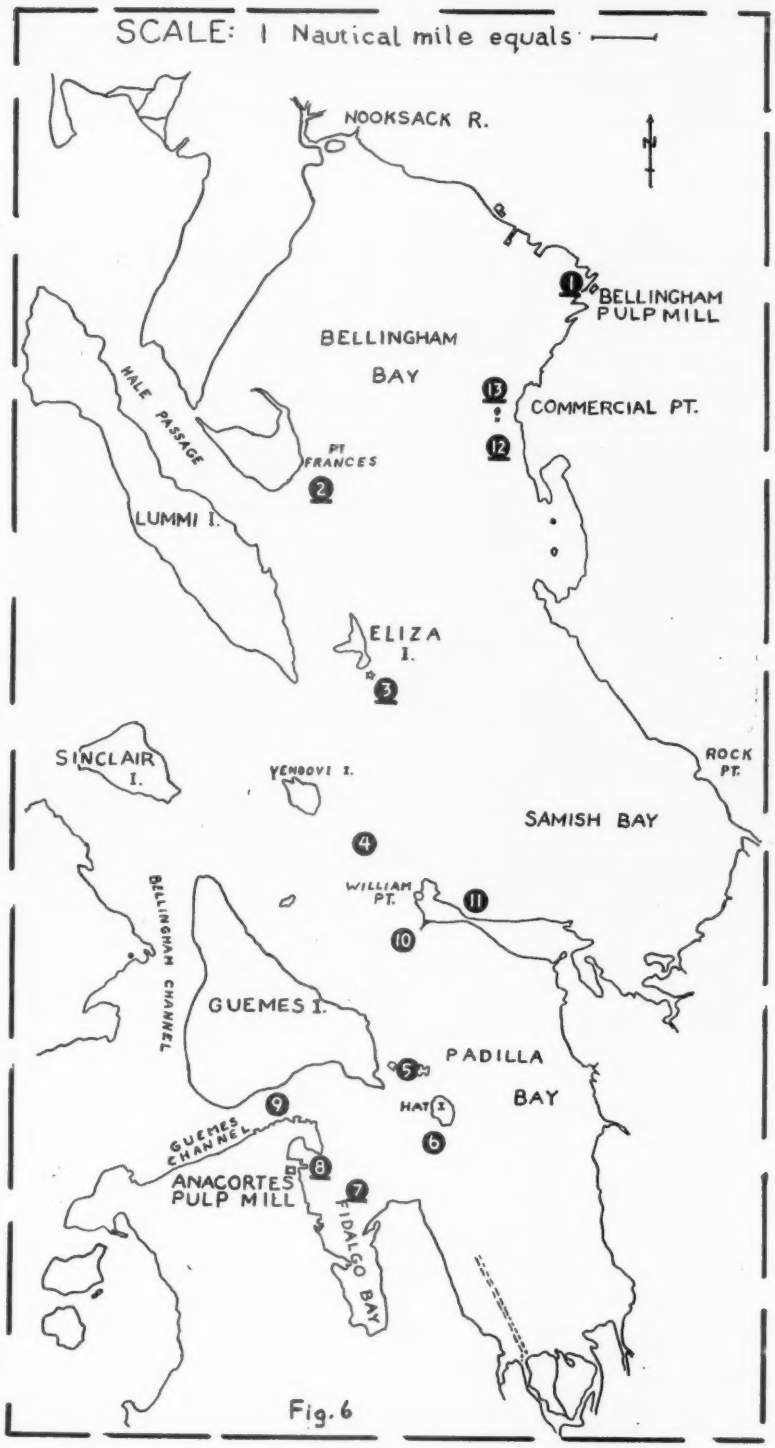


Fig. 6

Locations of the Thirteen Stations
Waste liquor found only at stations marked ●

CORRECTION—Figure 6 appearing on page 37 of the December, 1941, issue contained errors which occurred in the retouching of the authors' original for reproduction.

Above is the corrected Figure 6.

around to Guemes Channel and soon became diluted beyond detection in the westward flow of the current.

The final consideration was a study of tidal cycles. At each of the "gateways," there have been five tidal cycle runs. One cycle for each place was chosen with the intent of exhibiting typical conditions. The amount of pollution discovered at the line between Commercial Pt. and Pt. Frances is by no means an example of a permanent situation. For example a cycle of March 8, 1941, showed a maximum value of 80 p.p.m. of S.W.L. at Station 1, while there was but one value of 15 p.p.m. at Station 2 and one of 10 p.p.m. at Station 3, while no S.W.L. at all was detected on the Pt. Frances side of the bay.

The William Pt.-Clark Pt. run proved constant in all five tidal cycles. In only one instance of the 200 surface samples analyzed was waste liquor found. During the tidal cycle of May 23, 1941, a concentration of 15 p.p.m. of S.W.L. was detected at Station 3 near Jack Island. It was thought that the strong west wind which was blowing at that time may have been responsible for a current bearing that much waste liquor to have strayed more to the south than is usually the case. There is evidence from the testimony of experienced fishermen and boatmen in these waters that such a stray current may occur under these conditions, but that ordinarily Bellingham Bay water may never be expected to pass into Padilla Bay due to the presence of a tide rip slightly south of the line on which this tidal cycle was run.

On the line between Fidalgo and Padilla Bays, the same conditions as described in the discussion of Table V prevailed in varying degrees for all the tidal cycles. On some occasions, the effect of Padilla Bay water would carry slightly farther west, depending on the magnitude of the tidal run. With respect to pollution, however, none of the four stations, during the course of five tidal cycles ever showed positive tests for S.W.L.

We refer to one more sketch, Fig. 12, which pictures the shallowness of Fidalgo Bay and Padilla Bay, separated from each other by a deep chasm containing a very large volume of water. Also the relatively deep Guemes Channel is partly shown. The disappearance in Guemes Channel of detectable quantities of S.W.L. in such a short distance during ebb tide, might be ascribed to the fact that the waste liquor runs from the shallow shelf of Fidalgo Bay into a channel of deep water where dissipation takes place quite readily due to agitation and an ample opportunity for vertical diffusion. To account for the fact that there seemed to be very little tendency for waste liquor to drift eastward toward Padilla Bay, it was assumed there was sufficient mixing action in this body of deep water for diffusion and infinite dilution. This explanation is confirmed by statements of tugboat men that there are large eddy currents in the deep water. Hence, with this large volume of water with a natural mixing action between Fidalgo and Padilla Bays, there is small probability that these two bodies of water have any effect on one another.

From the field studies made in this area, no extensive pollution of Bellingham and Fidalgo Bays was found. Such pollution exists only in the immediate vicinity of the pulp mills. The large water bodies bring about infinite dilution and favorable conditions for disposal by the usual action of the sea.

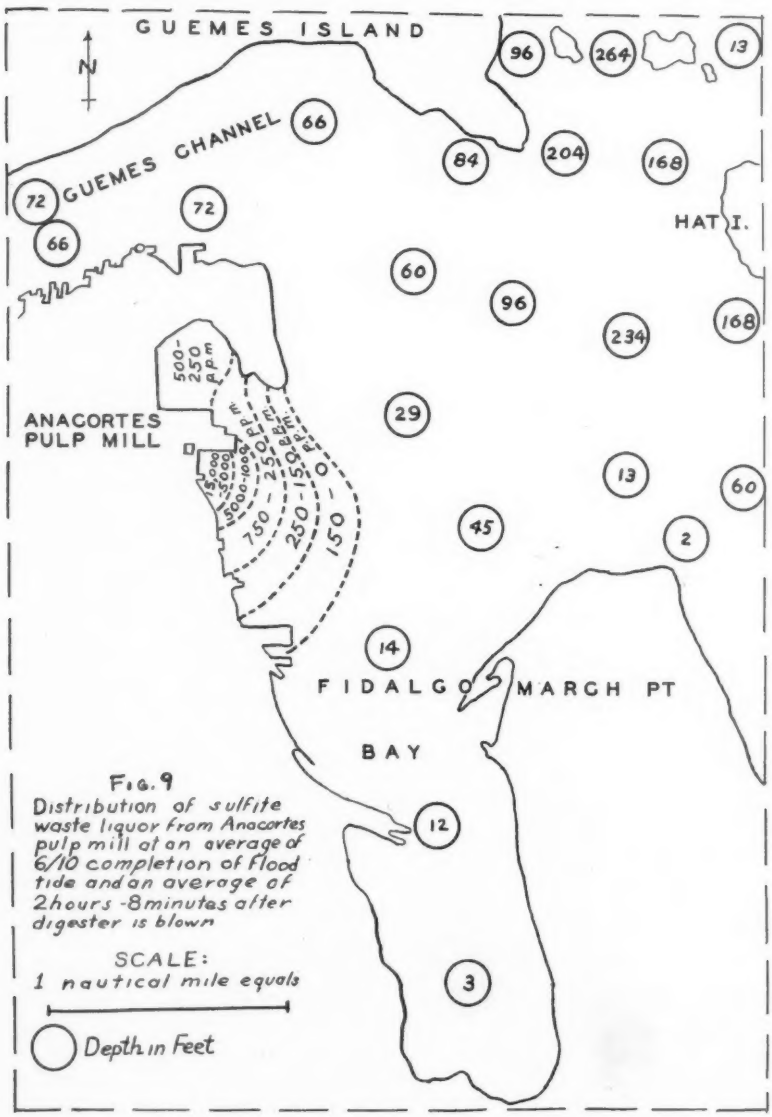


Fig. 9
Distribution of sulfite waste liquor from Anacortes pulp mill at an average of 6/10 completion of flood tide and an average of 2 hours -8 minutes after digester is blown

SCALE:
1 nautical mile equals

Depth in Feet

[2]Bulletin No. 2, Pollution series, state printer, Olympia, Washington, page 96, June (1940).

PULP
BLEACHING
COMPANY

WAUSAU,
WISCONSIN

●

CELLULOSE
PURIFICATION
EQUIPMENT

B. C. News Mills Not Yet Decided on Price

● While the general assumption is that British Columbia newsprint mills will fall in line with the price policy announced some time ago of International Paper Company for a $53 a ton quotation for the second quarter of this year, definite commitments have not yet been made, according to spokesmen for Powell River Company and Pacific Mills, Ltd.

"A lot can happen between now and the beginning of the second quarter," remarked one Vancouver executive.

Canada's far-reaching and strenuously enforced price control policy does not extend to regulation of exports, so that in that respect the mills can pretty well settle their own price without reference to the government—a privilege enjoyed by few Canadian industries these days.

Representatives of the newsprint mills in British Columbia say that it will be difficult, if not impossible, to maintain the present $50 price much longer. Cost of pulpwood and labor and almost every other factor entering into the production of paper has increased. Most of the companies have been obliged to pay two cost of living bonuses as required by Canadian wartime law.

BM&T Pays Large Bonus

● Climaxing a year of successful accomplishment in the face of many problems of supply and rapidly changing market conditions, Blake, Moffitt & Towne paid a bonus amounting to 10 per cent of the annual salary to all office employes, department heads and executives.

This liberal distribution, described by the management as an added compensation for services rendered during the current year, was made applicable to the staffs of all the 16 divisions in the organization.

The year 1942 marks the 87th anniversary of Blake, Moffitt & Towne in the paper business on the Coast; the firm being one of the pioneer institutions in the West, founded in San Francisco in 1855.

Walsh Appointed L. A. Manager Schermerhorn Bros.

● Russ Walsh, formerly connected with the Los Angeles office of Blake,Moffitt & Towne, on December 1st became manager of the Los Angeles office of Schermerhorn Bros. & Company, 1562 Industrial Street. The Los Angeles branch of the Chicago firm handles twine, cordage, yarn and duck products in its Southern California-Arizona territory. Walsh was 15 years with Blake, Moffitt & Towne.

Jack Gilbert Rejoins Zellerbach Paper Co.

● Lieut. Jack Gilbert is taking a month's trip East, after which he'll rejoin the headquarters sales staff of the Zellerbach Paper Company after serving a year in the army.

Burch Joins the Navy

● Clifton Burch in the order department of the Carpenter Paper Co., San Francisco, has joined the Navy.

BM&T Club Holds Dance

● In spite of a blackout which lasted from 7:20 until 10:00 P. M., Blake, Moffitt & Towne's recreational organization, the B.M.T. Club, held its annual Dinner Dance at one of San Francisco's famous night clubs on the night of December 12th.

A large number of members and their friends attended and all were unanimous in their acclaim that the affair was one of the most successful in the history of the club.

Carmichael Here From Manila

● J. C. Carmichael, prominent paper merchant of Manila, P. I., is in San Francisco on a business trip.

Garrity of Munising Calls on Coast

● Visiting the West Coast last month was William Garrity of the Munising Paper Co.'s Chicago office.

Brower Attends Sales Conference At Cloquet

● O. F. Brower, district sales manager of the Northwest Paper Company, San Francisco, made a trip through the Pacific Northwest, and then back to the mill at Cloquet, Minn., where he attended the annual sales conference of the company.

Morris Joins BM&T At Sacramento

● C. S. Morris, formerly of Wichita, Kansas, is now connected with the sales department of Blake,Moffitt and Towne, Sacramento Division.

BM&T Men in All Branches of Service

● Blake, Moffitt & Towne, San Francisco, is now represented in all branches of the Service.

Frank Morlock, Ted Luders and Jan Messchaert are in the Army; Bill Ball and Bill Hoffman, Navy; Joe Golding, Marines; and Jim Lang, Army Air Corps.

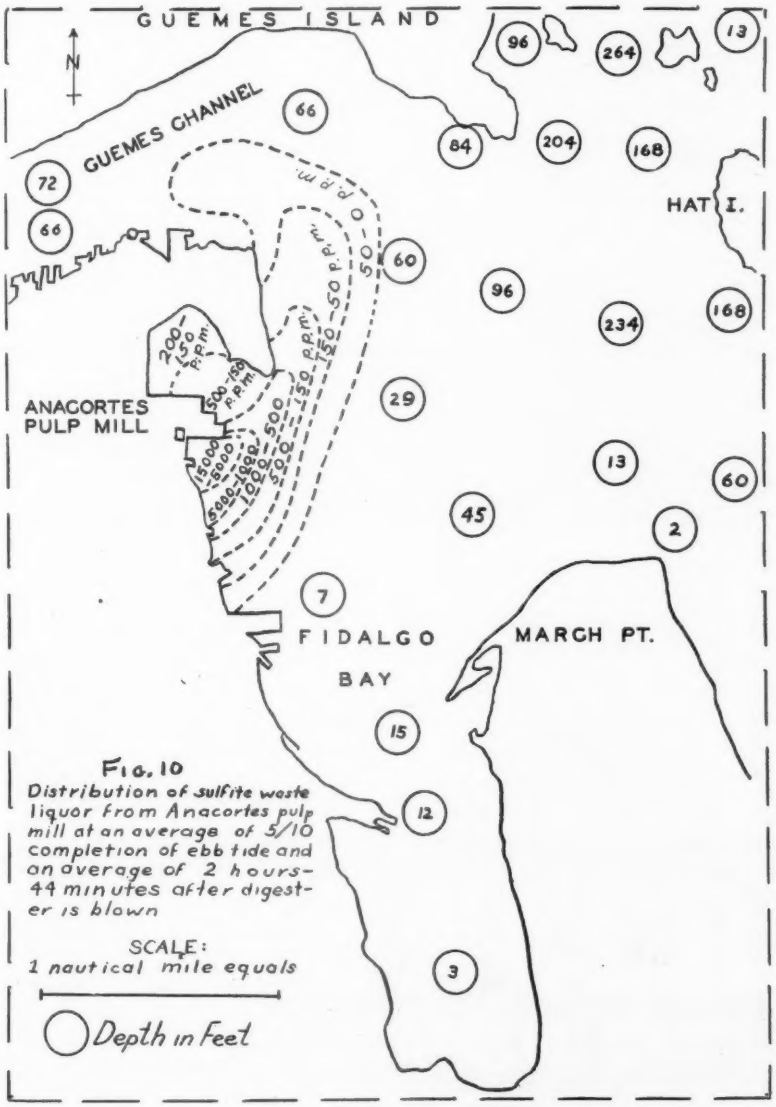


FIG. 10
Distribution of sulfite waste liquor from Anacortes pulp mill at an average of 5/10 completion of ebb tide and on average of 2 hours-44 minutes after digester is blown

Newsprint Down 1% In First Eleven Months

● Production in Canada during November, 1941, amounted to 300,308 tons and shipments to 320,860 tons, according to the News Print Service Bureau. Production in the United States was 82,621 tons and shipments 84,331 tons, making a total United States and Canadian news print production of 382,929 tons and shipments of 405,191 tons. During November, 27,860 tons of newsprint were made in Newfoundland, so that the total North American production for the month amounted to 410,789 tons. Total production in November, 1940, was 398,936 tons.

The Canadian mills produced 40,864 tons less in the first eleven months of 1941 than in the first eleven months of 1940, which was a decrease of one and three tenths percent. The output in the United States was 632 tons or one tenth of one percent more than in the first eleven months of 1940; in Newfoundland production was 2,809 tons or nine tenths of one percent less, making a net decrease of 43,041 tons, or one percent less than in the first eleven months of 1940.

Stocks of newsprint paper at the end of November were 142,030 tons at Canadian mills and 9,904 tons at the United States mills, making a combined total of 151,934 tons compared with 174,196 tons on October 31, 1941, and 192,586 tons at the end of November, 1940.

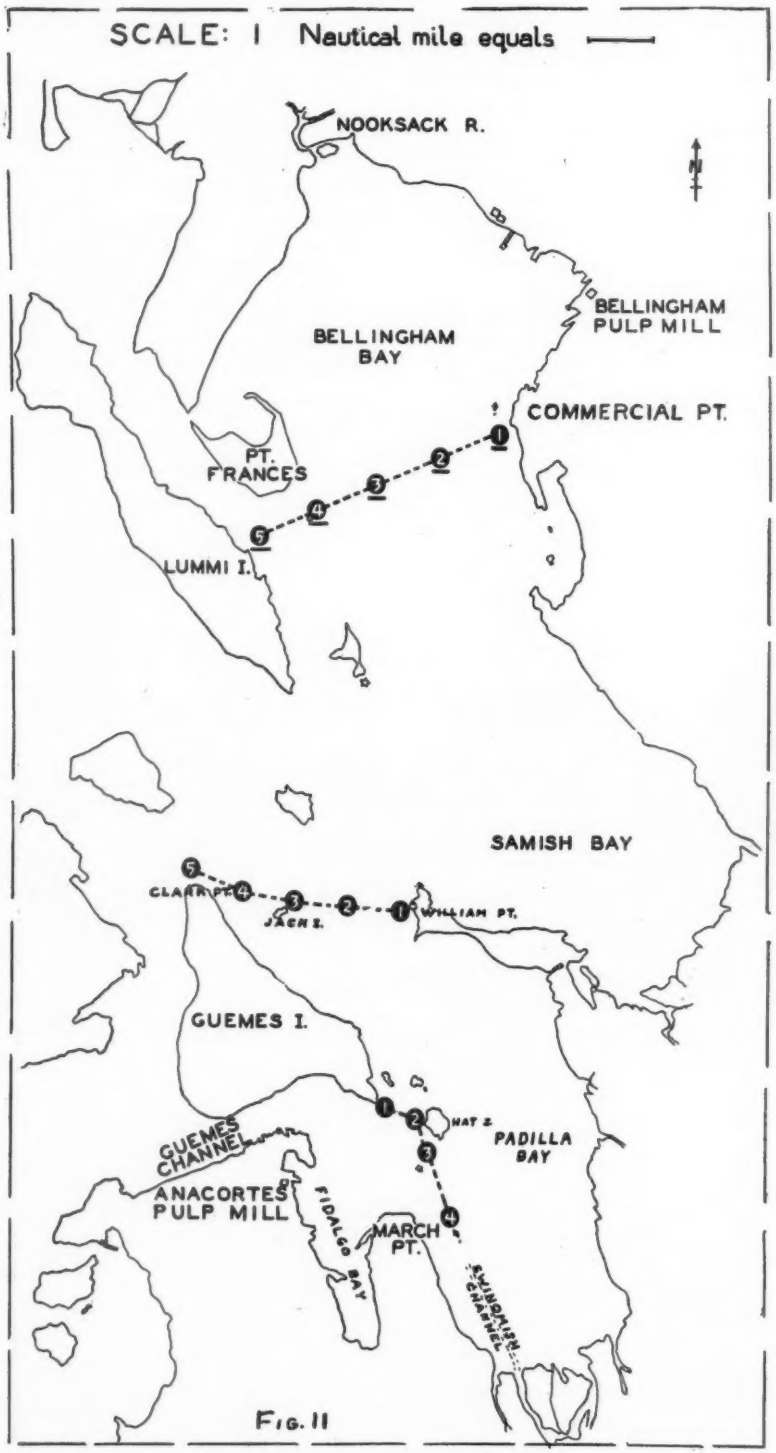


FIG. 11

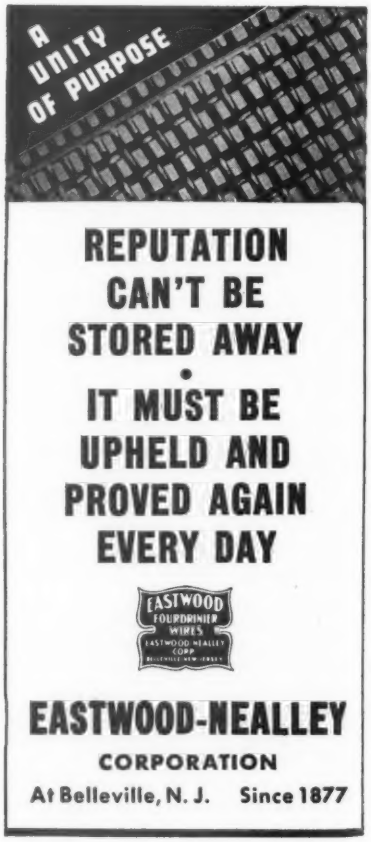
Locations of Tidal Cycle Stations
Waste liquor found only at stations that are marked ●

Irving Alter Now In Army

● Irving Alter, former star salesman of the Commercial Paper Company, San Francisco, and nephew of Marcus Alter, president of the concern, paid a visit to the office not long ago. Irving is now wearing kahki and is stationed at Camp Hahn.

Calof Given Stag Party

● Sidney Calof, venturing upon the sea of matrimony Nov. 30th, was honored guest at a stag dinner held at the Ambassador Hotel, Los Angeles, on November 28th. The benedict is manager of the Badger Paper Co., Southgate (Calif.) paper jobbers.


A UNITY OF PURPOSE
REPUTATION CAN'T BE STORED AWAY
•
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At Belleville, N. J. Since 1877

Fix Mill Prices For Kraft Wrapping

● Stable producer prices for four grades of kraft wrapping and bag paper are assured for the first quarter of 1942 as result of individual agreements reached between the Office of Price Administration and 16 principal manufacturers, Leon Henderson, administrator, announced December 12th.

Under the agreements, producers will not charge more than 4¾ cents a pound for "imitation kraft" and "standard kraft" wrapping paper, nor more than 5 cents a pound for "No. 1 kraft" wrapping paper. Standard kraft bag paper, it was agreed should not sell above $87.50 a ton.

These are all delivered prices for carload lots and apply to dry-machine finished paper.

For types of kraft paper other than the four given above, the producers agreed to retain the price differentials in effect during the period immediately preceding July 1, 1941.

The prices resulting from these agreements are based upon actual differences in production costs and testing qualities, rather than on artificial geographical differentials.

Definitions agreed on by OPA and the manufacturers for the four grades of kraft paper for which specific maximum prices were determined follow:

(a) Imitation Kraft Wrapping Paper: any wrapping paper containing more than 50% waste materials (including broke) which tests 39% or less of the basis weight, Mullen Test under Standard TAPPI Testing Procedure.

(b) Standard Kraft Wrapping Paper: any kraft wrapping paper containing 50% or more sulphate furnish of virgin pulp or broke, which tests 89% or less of the basis weight, Mullen Test under Standard TAPPI Testing Procedure.

(c) No. 1 Kraft Wrapping Paper: any kraft wrapping paper containing 50% or more sulphate furnish of virgin pulp or broke, testing 90% to 99% of the basis weight, Mullen Test under Standard TAPPI Testing Procedure.

Those manufacturers who asserted that their costs had increased since May, 1941, were requested to supply the Office of Price Administration with full cost data substantiating those statements.

Northwest Log Production Data Released

● More than 136 billion board feet of logs were removed from the forests of Oregon and Washington during the 16-year period 1925-1940, according to a report just released by Stephen N. Wyckoff, director of the Pacific Northwest Forest and Range Experiment Station. Logs at the rate of 8.5 billion feet annually were harvested to supply sawmills, pulp mills, veneer and plywood plants and other of the wood-using industries so vital to the economy of the Pacific Northwest, and to furnish cargo after cargo of export logs.

The report "Log Production in Washington and Oregon, 1925-1940," written by Herman M. Johnson, presents information compiled from records obtained by the U. S. Forest Service in cooperation with the Bureau of the Census. The report includes only material removed in saw-log form which constitutes approximately 90 per cent of the annual demand upon the forests. The remaining 10 per cent is incident to the production of fuelwood, pulpwood, poles, piling, and similar minor products.

Log production is shown by states, east and west side of the Cascade Range, economic production units and by species. Peak production in Washington was reached in 1929 amounting to about 7.4 billion feet. In 1937, the nearest approach to the peak, production was 5.1 billion feet. In Oregon the peak was reached in 1937 with 5.3 billion feet. Since 1937 Oregon log production has exceeded that of Washington by about 300 million feet.

Douglas fir log production in western Washington has shown a more or less steady decrease during the past decade while in western Oregon the production of this species has been increasing. During the past several years there has been an increasing flow of Douglas fir logs from Oregon to the sawmills and plywood plants of Washington.

Ponderosa pine log production in eastern Oregon has increased nearly fourfold since 1932 reaching an all-time peak in 1940 of over 1.5 billion feet.

Copies of the report may be obtained from the Pacific Northwest Forest and Range Experiment Station, 423 U. S. Court House, Portland, Oregon.

McLarney Transferred To San Francisco

● Felix McLarney, of the Port Townsend Division Crown Zellerbach Corporation, has been temporarily transferred to the San Francisco headquarters, in the purchasing department.

This belt's 'housebroken'

Quite an operation, this. A sample piece of Pioneer Conveyor Belt is sent to the laboratory... opposite ends of it clamped into the Olsen tensile machine...then the fight is on. The machine wins out, all right, but only after it has given the belt sample many times the beating the belt will ever be asked to take in normal service. At the exact point of failure, the number of pounds pull is recorded, automatically. The fracture is examined closely to determine belt uniformity. Yes, this goes on daily. It means that we're never satisfied until we *know* that you are getting a conveyor belt even better than you wrote into specifications, to make your operating costs lower than you expected to pay. Try a *job-tailored* belt.

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Cattle Fodder From Sulphate Pulp

"Two years' bad harvests in Swedish agriculture, and the difficulty of importing fodder through the blockade, have led to cellulose being used as food for horses and cattle," says The Swedish Wood Pulp Journal for November 15, 1941. "It has proved excellent for the purpose. So far, only sulphite pulp boiled for a long time to extract the sulphite alcohol has been used. The shredded pulp is fed to the animals either as it is, mixed with other fodders, or with molasses and other nutritive substances added in manufacture to give it a better taste and to provide the requisite albumens and salts.

"At the beginning of July the Government contracted with the cellulose industry for 200,000 to 250,000 tons of sulphite pulp for cattle food to be delivered in the period 1 July 1941—30 April 1942. As such fodder is in increasing demand, the production of sulphite pulp for this purpose might possibly be increased still more, though for various reasons the additional quantities can hardly be very large.

"In the mean time sulphate pulp has also been suggested for cattle food. It was so used in the last war, but the rather raw product available then was not quite suitable, while at the same time people had less experience of how to combine the rations with other feeding stuffs. During the past summer and autumn the experimental stations of the High School Agriculture have investigated the digestibility and food value of sulphate pulp cooked in different ways. As a result it has been found that the food value of well cooked sulphate pulp is approxi-

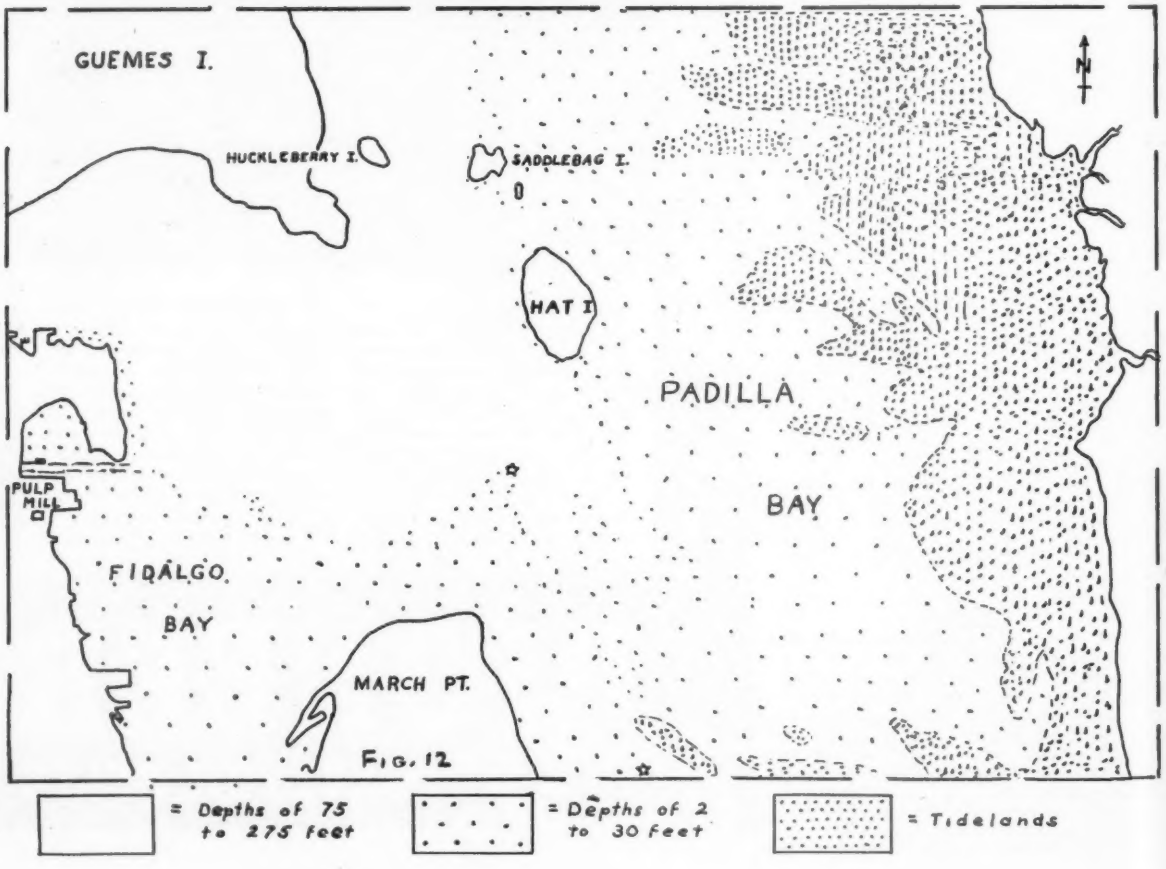

FIG. 12

"NON-USERS ARE THE LOSERS"

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These are strenuous days in paper mills, with heavy emphasis on production schedules. TENAX FELTS are doing their part, and it has become a most important part, by producing perfect paper in record time and record quantity — "TENAX" might well be the password at the Manufacturers Convention.

"Non-Users Are The Losers"

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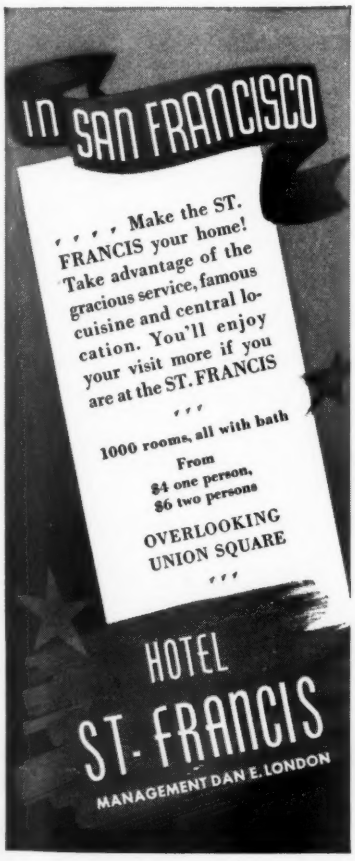
Pacific Coast Representative: ALAN C. DUNHAM, Portland, Ore.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mately equivalent to that of the sulphite pulp previously used, i. e. 75 or 80 food units per 100 kilos (1 food unit=the food value of 1 kilo of barley). If treated in the same way, adding molasses or mixing it with other feeding stuffs, it has proved as acceptable to the animals, as the sulphite pulp.

"In consequence of these encouraging results, the Food Commission contracted, in the beginning of November, the delivery during the winter of 80,000 to 100,000 tons in all of sulphate pulp for fodder from four mills. Fodder pulp is "cooked down" much more in manufacture than is ordinary kraft pulp, the yield of pulp per unit of raw material being estimated at about 30 per cent less; the above quantities thus correspond to a normal production a third larger. The contracted price of the pulp is said to be very low, and the prices of the by-products of various kinds, such as sulphate rosin, turpentine, etc., have not been raised either. The mills have thus not been able to get any compensation in higher by-product prices, such as was given in respect of sulphite alcohol.

"The only mills able to undertake these deliveries are therefore those whose production and raw material costs are low. The mills with which the above contracts have been made are Husum (Mo & Domsjo A.-B.), Iggesund (A.-B. Iggesunds Bruk), Skutskar (Stora Kopparbergs Bergslags A.-B.), and Ostrand (the Swedish Pulp Co.). Some of these mills have been standing idle for long periods this past year, and from the point of view not least of the workers it is important that employment can be provided for some months to come in work beneficial to the general national provisionment."

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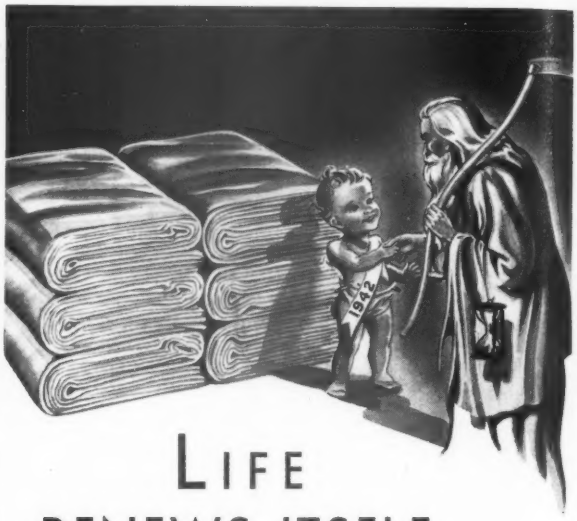

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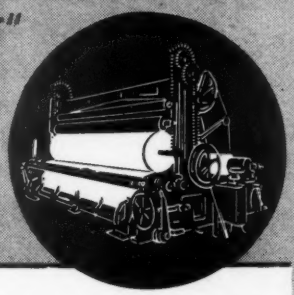

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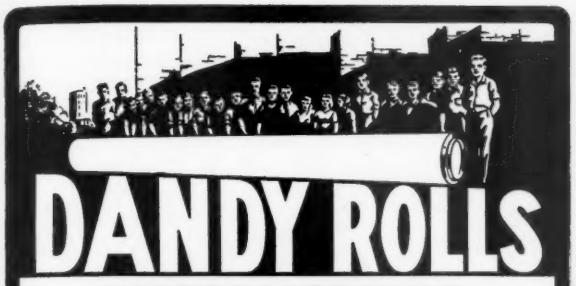

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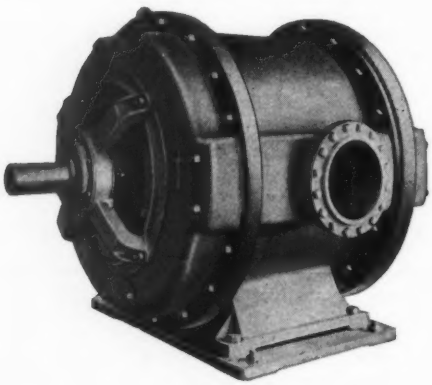

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